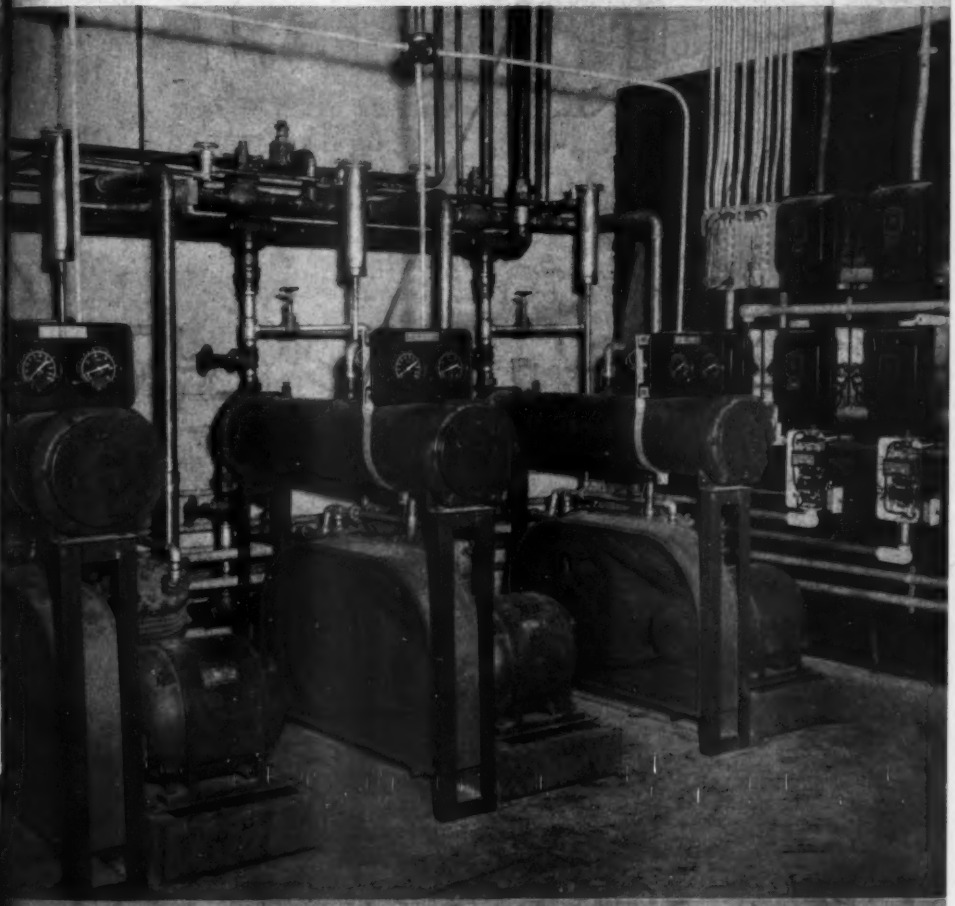
The Refrigeration Service Engineer

VOL. 15 NO. 9 ★ ★ ★ SEPTEMBER · 1947

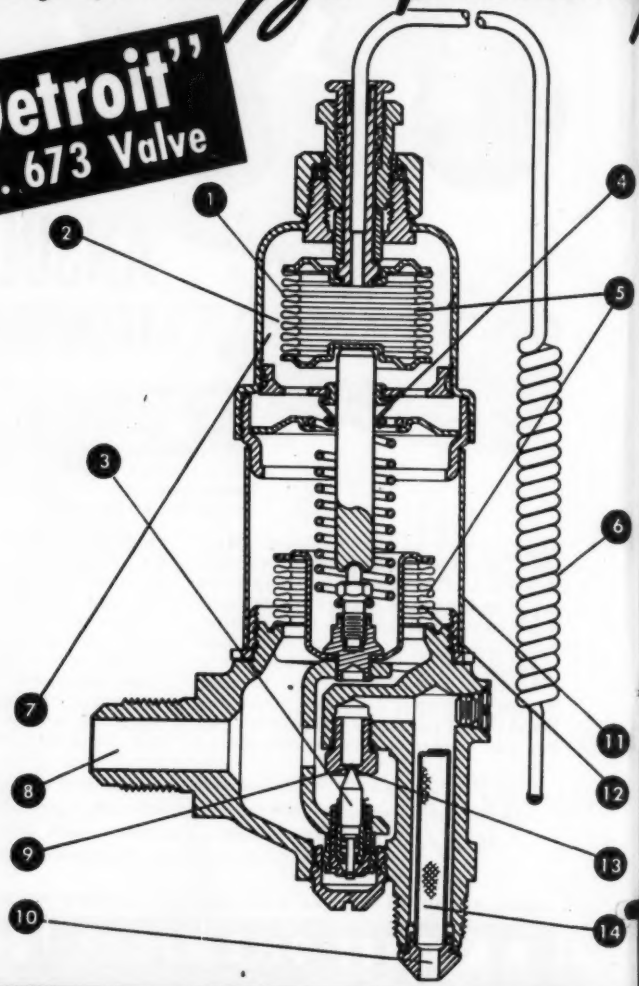


Prize Installation of Compressors Made by R.S.E.S. Members. (See story on page 29)

THE REFRIGERATION SERVICE ENGINEER, Nickerson & Collins Co., Publishers, 435 N. Waller Ave., Chicago 44, Ill. Published monthly, Vol. 15, No. 9, September, 1947. Entered as second class matter March 4, 1938, Chicago, Ill., under the Act of March 3, 1879. Subscription in the United States, $2.00 per year; all other countries, $3.00 per year.

Let's Analyze Quality

"Detroit" No. 673 Valve



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- **"EITHER-WAY" FLOW**

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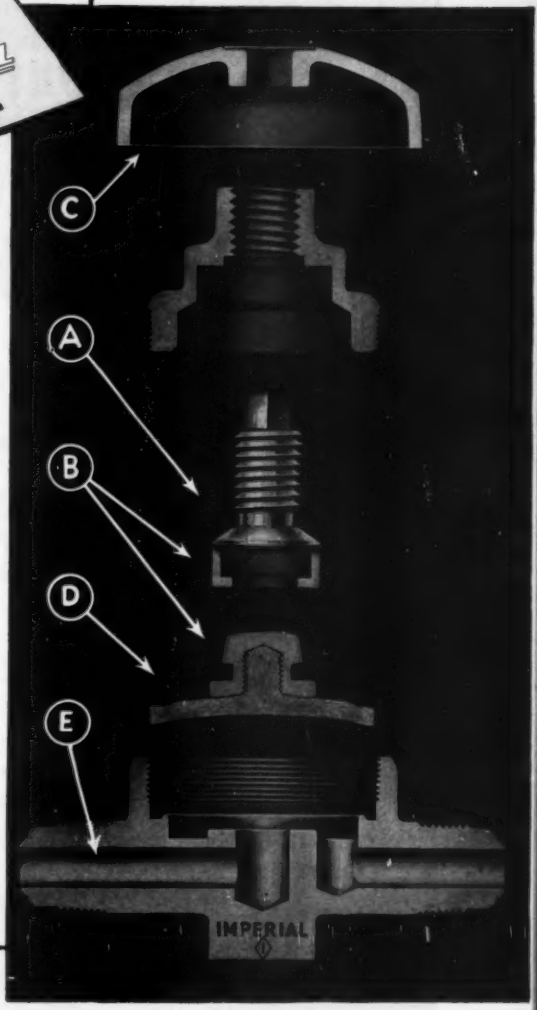

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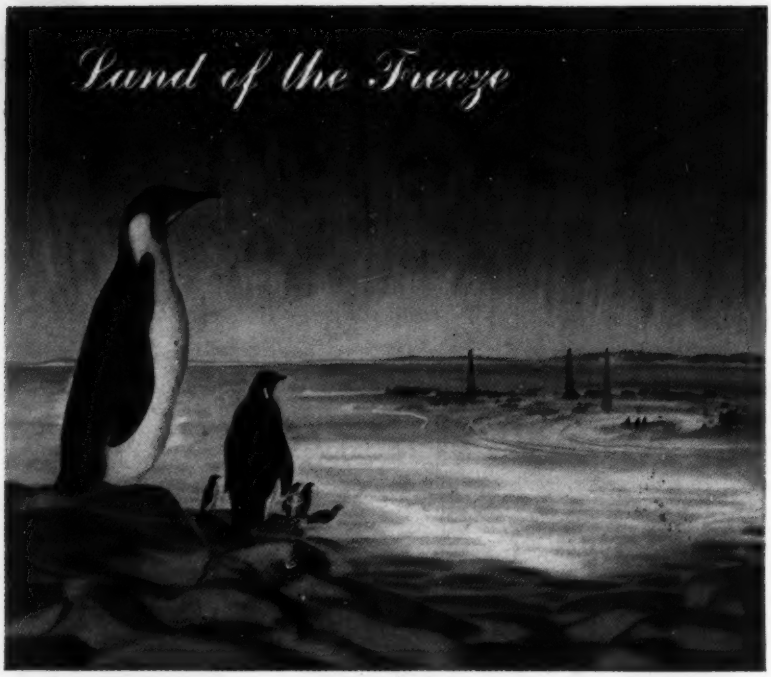

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* *A favorite adjective employed by users to describe their Mills Condensing Units.*

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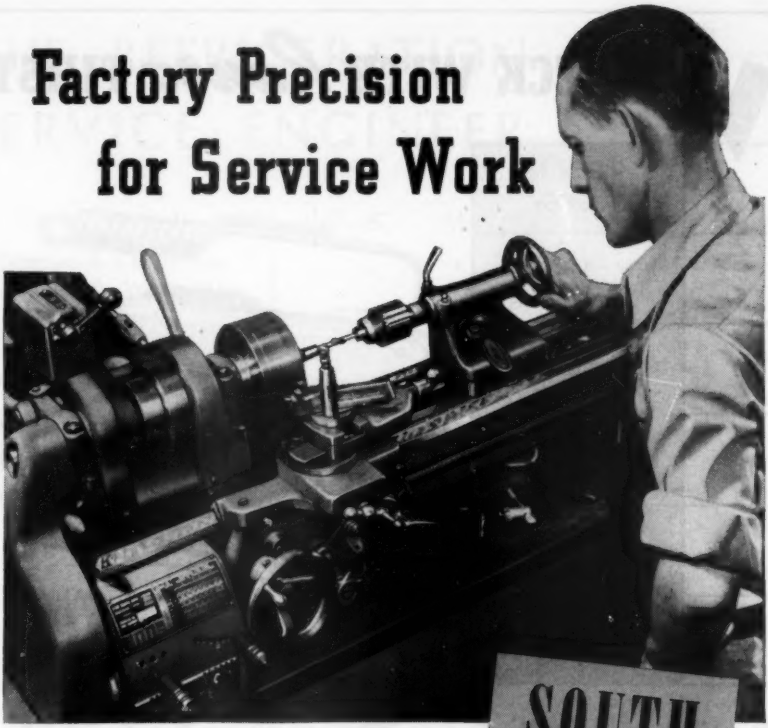

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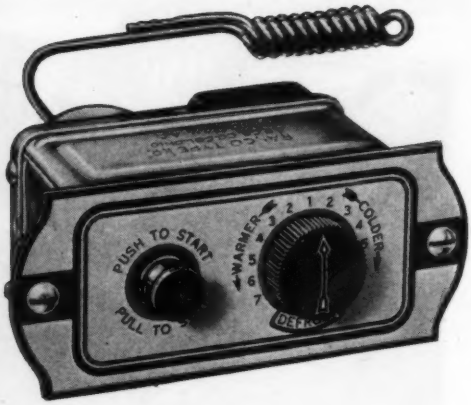

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Vol. 15 SEPTEMBER, 1947 No. 9

Contents

~~Dry as a bone~~
~~Dry as the Sahara~~
Dry as a DFN Dehydrator

Yes! DFN

gives new meaning to the word DRY!

DID YOU KNOW that one of the most difficult materials to keep dry, is a drying agent? Only a few moments' exposure to the atmosphere in handling, causes it to adsorb considerable moisture, reducing its drying capacity when used on the refrigerating line.

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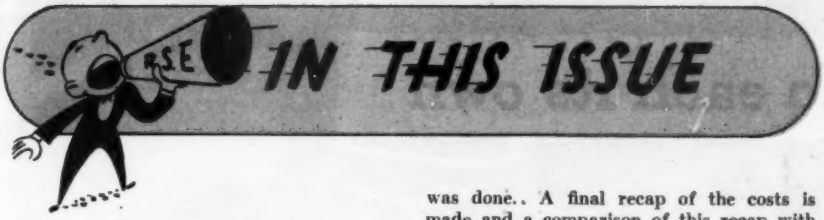

EXPANDING business, aging equipment and shortage of replacements are in many cases placing a strain on refrigerating facilities to the extent that they are no longer doing an adequate job for the owners. Under the pressure of the owners' needs, the serviceman endeavors to improve conditions and in various ways increase capacity. In some cases he may resort to changing the refrigerant from "F-12" to "F-22." This has been done successfully in a number of installations but the average is not very high. The experience of several such changes are related by H. B. Roberts, starting on page 31 of this issue.

A COMPARISON of the methods employed for freezing foods in warehouses and the advantages from the warehouseman's viewpoint in meeting his problems is told in an article entitled "Freezing Storage of Foods in a Refrigerated Warehouse" by T. E. Evans, beginning on page 34.

MANY of the existing buildings and rooms required to be insulated and converted to refrigerated rooms have ceilings much too high for economical operation. Space above the minimum requirements of the application means wasted refrigerating capacity and it becomes advisable to construct a suspended ceiling. The plans and description of insulated suspended ceilings are provided by Armstrong Cork Co., on page 38.

DONALD F. DALY, author of the series of articles "Take the Guess Out of Estimating," continues this month on page 40 with his method of estimating the cost of rebuilding a commercial system. His estimate and work sheets are shown in detail and he describes the work done and how it was done.. A final recap of the costs is made and a comparison of this recap with the estimate.

THE control of refrigerant feed with an electric eye offers an interesting method which may be employed in the larger ammonia systems usually fed with a high side float. It offers a more positive control with the advantage of a visual level of refrigerant. A description appears on page 45.

THE latest thing in mobile refrigeration is a rollaway ice skating rink designed to roll out on the dance floor of a night club for the duration of the show. It is a fine piece of engineering described on page 47.

FREEZING rose bushes in storage before shipment calls for another application of refrigeration, adding to the ever expanding list. Read about it on page 48.

ONE of the service pointers this month suggests the use of boiling oil as a means of dehydrating parts. The department appears on page 50.

COVER

OUR front cover this month is a photo of the installation which won first prize in a recent contest conducted by the Houston Chapter of the Refrigeration Service Engineers Society. The contest, ending July 1 of this year, included any installations made during the previous six months by members of the chapter. Entries were judged on neatness of work, most desirable location in respect to air circulation and ease of servicing, correct installation of tubes and pipes with particular attention paid to oil traps, vibration, exposure to knocks or damage, etc., and to the overall appearance and arrangement of the equipment.

(Continued on page 78)

Each Jack & Heintz condensing unit is equipped with its own Jack & Heintz electric motor and is therefore backed by a single manufacturer with undivided responsibility. The entire unit is a product of the engineering skill and precision manufacturing for which Jack & Heintz is world renowned.

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Increasing Capacity with "Freon 22" in "F-12" Units

By H. B. ROBERTS*

A RECENT article in a trade periodical stated in effect that a new development in refrigerant gases (F-22) would revolutionize low temperature refrigeration, intimating amazing new performances. Recent papers by Guy R. King and Fred McKenna point out clearly that the new gas has a place but that it is no "wonder gas" as far as its performance is concerned.

Demand by the industry brought about the development of adequate F-12 machines. This will also develop with F-22 as it is justified. So far as I know only one manufacturer will recommend their machines for F-22, and only then if they are modified. Most say they are not prepared to quote on a machine for that refrigerant.

Because of that condition there are four histories of standard F-12 machines used with F-22 that may be of interest to you. Please bear in mind that the purpose of the use of F-22 was an effort to accomplish a particular job and was not research on machine performance as such. For that reason no particular effort was made to record gas and liquid temperatures.

Locker Plant Changeover

During the early part of the war a 600 locker plant was installed in northern California with the usual freezer, chill and ageing rooms. The condensing unit was a York 44T8FWD, which is a dual 8 cylinder machine with 4" bore and a 25 hp. motor located between the two machines on a common base. It has a water cooled condenser and is intended for medium temperature service, being used quite often on air-conditioning. Standard A.S.R.E. rating is about 12 tons. The low side in this plant was very well engineered but the condensing unit was too large, which was due to the war time conditions. In this case it was very fortunate as the owner decided to enlarge his plant and contract for some fish freezing.

* Engineer, Research Dept., Food Machinery Corp., San Jose, Calif.

This was a good opportunity to balance the entire plant and put some real load on the condensing unit. In fact calculations showed it was too much load and there seemed to be two alternatives. First was to increase the compressor speed approximately ⅓ which was possible with the existing motor and condenser. Second was to change the refrigerant to F-22 which would give about the same ⅓ capacity increase, but which was considerably more expensive. The determining factor was the moisture condition that had existed since the plant was built, due to low side leakage and operation at a suction pressure of 5" to 10", and it was decided to change the refrigerant to give a positive suction pressure at all times.

Changing over from "F-12" to "F-22" has been a much talked-about means of increasing capacity. In a few cases it has been actually tried with varying results. In general, the change is not recommended but there are extenuating circumstances under which it is worth attempting. The author's ratio of successes out of four attempts related in this article, indicates the need for careful consideration before a change is attempted.

The F-12 was taken out and F-22 was charged into the system. Nothing else was changed. Adjustments were made to the expansion valves, pressure controllers, and back pressure valves.

In the past two years the maintenance of this plant has been lower than before it was enlarged, and the following observations are the high-lights of this period.

As expansion valves are replaced, F-22 valves are being used. The F-12 valves, set

at about minimum superheat, had controlled very well at the average conditions. If the suction pressure gets out of its usual range the control is not very good but it is not expected to be as the valves are used for a pressure-temperature relationship for which they were not intended. Time has proven that it would not have been economical to have replaced the valves two years ago.

The moisture condition has been cleared up with a good drier.

Mechanically the results have been good. York did not at that time recommend this machine for F-22 except with increased cylinder clearances and heavier valves with possibly water cooled heads. The cylinder and piston wear averages .001" and is very uniform. The crank-bearings are loaded heavier but the wear was .003". The crank journals are in good shape and perfectly round. The valves show no more wear than is common with F-12 and have not yet been replaced.

In summary let us say that after two years the change in refrigerant has been very satisfactory. One point worth consideration is the fact that the machine had been broken in mechanically before the change in refrigerant and with that in mind it would be well to heed Yorks advice on cylinder clearances, etc. if a new machine is used. The normal operating pressures are 25 lb. cut-in, and 0 lb. cut-out. The average summer head pressure is 160 lbs. Suction temperature at the compressor manifold is about plus 25 degrees. Discharge temperature is unknown accurately but it does not warp valves nor cause any break-down of the oil. The oil was a standard brand low temperature oil being used with F-12 and, as previously stated, was not changed.

Brunner Low Temperature System

In October 1945 a Brunner Model W 750 FL was installed with a blower coil low side for some low-temperature test work. This is a 4 cylinder V type machine, 4¼" x 3" with a speed of 450 rpm. with a 7½ hp. motor, intended for F-12 low temperature work. Because we intended to produce a temperature of around —60 it was decided to use F-22, on general principles, so the oil was changed for operation at the desired temperature and it was charged with refrigerant.

Losses and load in general was greater than anticipated and as this was test work on which the machine could be written off we carefully speeded the compressor to load the motor at 120% at regular operating conditions. This resulted in a compressor speed of 525 rpm. and it was necessary to carefully nurse the unit on the temperature pull-down, by throttling the suction service valve. This is 75 rpm. above the recommended maximum speed.

Ample water was available and the condensing pressure averages 140 lbs. The suction pressure varies from 0 lbs. to 16 in. depending on the desired conditions. General practice has been to carry the frost line to the flanges of the suction manifold on the compressor body and this was found to produce the best over-all performance.

When the tests were completed this year this machine had been in service approximately 4000 hours under conditions that I feel were rather severe. The machine was taken apart to check it as it was desired to use it on another job. It was found to be in excellent condition, the average piston and cylinder wear combined was about .0015", the rings and valves were in good shape. The entire machine was assembled without any new parts but new gaskets were used.

No moisture conditions were ever experienced. There was a wax separation in the expansion valve with the first low temperature oil used and it occured at about —45 getting progressively worse to —70. This oil was changed to an oil similar to transformer oil and there was no more difficulty.

In summary it can be said that the use of F-22 in this unit was mechanically successful. Several times during the operating period we carefully checked the load against the displacement and had a favorable result especially when it is considered that the compression ratio was around 25 to 1. Such a plant would not exist in actual commercial practice and the only reason we used it in that manner was the shortage of proper equipment for two or three stage compression when the installation was made.

Display Freezer Not Successful

After several successful applications of F-22 to low temperature work, using standard F-12 units, a job came up in '46 which again seemed to call for its use and which was not successful.

We must not forget that we are using a machine for a purpose for which is was not designed and no discredit should be taken, nor is it intended, against any of these ma-

chines. All machines are standard makes and enjoy good reputations.

This particular job was a 20 cu. ft. open top display freezer of unknown manufacture. The low side consisted of four eutectic plates and the condensing unit was a ⅓ hp. F-12 Universal low temperature unit with air cooled condenser. We were having trouble maintaining temperature and it was obvious that the condensing unit was too small. An ammeter was used to check the motor load and it was pulling 60% of name plate rating. Past experience was that it is seldom necessary to throttle this unit on a temperature pull-down and that the electric load might be in line. Condensing units were very scarce so we decided to either speed up the present unit or change to F-22 even if it was necessary to add condensing surface, until a new ½ hp. unit could be had. F-22 was charged into the unit, the expansion valve was adjusted, and a careful check on the motor load was made with the ammeter. Recovery of temperature lost during the shut-down was very good although the expansion valve was very hard to adjust, being very sensitive to a small change in adjustment. The frost line was carried well into the heat-interchanger.

No Improvement Shown

Two days went by and a recording temperature chart showed no improvement in cabinet temperature compared to the F-12 operation. Being keenly disappointed at the results, careful notes were made of all conditions and they were as follows: Motor load was 85%, suction pressure was 7 to 10 lbs., head pressure 170 to 180 lbs. There had been an appreciable increase in power consumption but no apparent increase in refrigeration produced.

The compressor was taken off its base, stripped down and carefully checked. No indication of valve leakage or piston blow-by was found. It was decided to reduce the piston to valve plate clearance to the very minimum and .010" was removed from the top of the cylinder. It was determined that there was still sufficient clearance for the mechanical operation of the machine and it was assembled and started up.

After two more days the previous conditions still existed, i.e., the amount of refrigeration produced was about the same, the power consumption was up and we had nothing to show for it. By all rights we should have had about a ⅓ gain in refrigeration.

In altering the basic clearances in a compressor it should be said that a service engineer cannot expect to alter basic machine design to advantage. Such things are carefully worked out by manufacturers and should not be "fiddled" with in the field.

Another Failure

Early this year almost an identical situation arose with a unit cooling an alcohol for some laboratory work. It was a plain case of condensing unit overload with plenty of low-side, and feeling that in the previous machine something had been overlooked the whole thing was gone through again. It didn't work that time either.

In conclusion we can say that there was an increase in tonnage, decreasing as the compression ratio approached 7 or 8 to 1. Current used was greater with F-22 but there was no return on that investment. Please let me call to your attention that the compression ratios of the two refrigerants are practically the same though the pressures are quite different. We were very careful to be very fair in the load conditions for the comparison and are still at a loss to explain the result. Comments will certainly be appreciated.

Carrier Required Ring and Valve Changes

Early in 1946 a Carrier, normally used with F-12, operated at about 1500 rpm. with a 3 hp. motor, was installed on a shell and tube cooler to cool an alcohol brine in some experimental work. It was anticipated that temperatures of —40 to —50 would be required but that the load would be relatively small. Consequently insulation was not as heavy as would ordinarily be used. It was estimated that the job would operate for 6 months and then be dismantled. The machine is a 4 cylinder V type, and was run at 1750 rpm. during the war. It is equipped with force feed lubrication. We put in F-22 and low temperature oil.

As summer came along we were a little short on capacity and lost temperature by mid-afternoon. Again faced with the economics of a 6 months write-off it was decided to speed up the compressor for the summer. By providing a speed of 2050 rpm. we had a motor load of 110% at low suction conditions.

The shell cooler was provided with a spe-

(Continued on page 78)

Freezing Storage of Foods in a Refrigerated Warehouse.

By T. E. Evans*

FOOD preservation, by refrigeration, is a tremendously important factor in our national economic structure. By it, seasonable surpluses of perishable foods may be held pending subsequent out-of-season distribution. Periods of scarcity are thus reduced. It is only in recent years that consumer appreciation of frozen foods has become established, and with this consumer acceptance the preservation of foods by freezing has come into its own. Research has developed operating techniques to a point where it is an accepted fact that the flavor, color, quality, palatability and nutritional value have not been impaired. Proper cold temperatures reduce the elements of waste, through retarding bacterial, enzymatic and mold growth. In all this, the refrigerated warehouse plays an important part.

Freezing Methods

There are many procedures followed in freezing perishable products, which may be generally classified as immersion, indirect contact, still air or blast air.

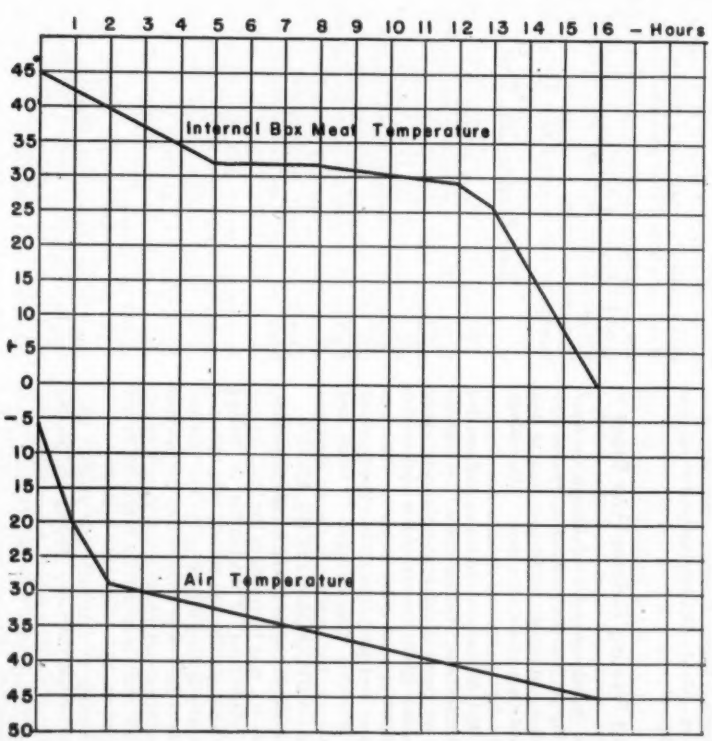
Immersion freezing brings about immediate contact of the product with the refrigerant medium and results in a very high rate of heat transfer. Mr. Taylor's T.V.A. method will illustrate immersion freezing more clearly. It was employed in freezing strawberries. A refrigerated tank containing a sugar solution was used. The temperature of the solution was reduced to approximately 0 F. The strawberries immersed in this solution required about five minutes to freeze, following which they were removed and the excess sugar solution thrown off by means of a centrifuge.

Freezing by indirect contact offers a practical method. An obvious example would be the manufacture of ice. This consists of the immersing of a can of water in the refrigerant. The Birdseye multiplate freezer is an application. It consists of an insulated cabinet containing hollow metal plates through which the refrigerant is circulated. The plates are designed to accommodate special packages and freezing is effected by contact with the top and bottom of the package.

The successful service engineer finds it more and more necessary to become familiar with the larger storage facilities for foods, which may be located within his territory, to prepare himself for the day he may be called to render service. This article, among other things, provides a comparison of the different methods of freezing, a few factors to be considered and desirable conditions in the plant.

Blast freezing has reached a development stage which we believe offers the greatest commercial value in the freezing of foods. Blast freezing employs high velocity low temperature air. The product blast frozen is sufficiently exposed on all surfaces to the air stream. This accelerates the rate of heat transfer for freezing. The combination of quick freezing and low air temperatures reduce desication when compared with still air or slow freezing. The temperature range of a blast freezer is very flexible, the most common operation temperatures being from —20 to —40 F. As to design of a blast freezer. there are many, but to convey the general idea, it may be described as an enclosed insulated area or room through which is channeled and developed, by means of blowers, a high velocity of confined air. Efficiency and economy of operation require compactness, therefore, the refrigeration coils are located immediately adjacent to the sides or ceiling of the room. The recir-

* United States Cold Storage Corp.
Presented at Regional Training Conferences sponsored by The Refrigeration Research Foundation, at Kansas City, Mo., and French Lick, Ind.



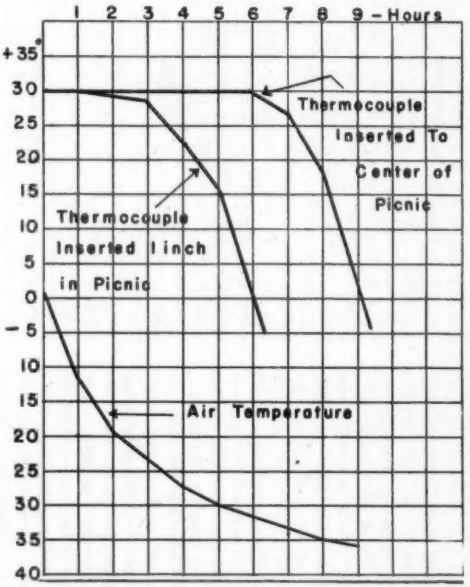


Fig. 1—(left)—Time-Temperature curves showing the freezing time for boneless beef in 50-lb. cartons in the blast freezer.

Fig. 2—(right)—Time-Temperature relation in the blast freezing of picnics.

culating air flow cycle is through the coils, then through the spread product, then through the coils, etc.

Still air freezing, because blast freezing devlopment has been so recent, remains the common method practiced by most commercial warehouses. Good results are obtained in this method when temperatures, humidity and spreading are given proper consideration.

Slow Freezing Causes Shrink

Research has demonstrated that during slow freezing, large ice crystals are formed. The size of these crystals may be sufficient to rupture the tissue cell walls of the product. One result is that when the product is defrosted, it is unable to retain the free moisture. This obviously produces abnormal purging or shrink with attending flavor loss. Quick freezing produces small ice crystals, thus reducing cell damage and the attending defrosting losses are held to a minimum. Quick freezing preserves to a greater extent the original color of the product.

Fast Freezing Reduces Floor Space

The warehouseman's advantage in blast freezing is that the product so frozen may be piled within 20 to 50 per cent of the elapsed time of slow freezing. This affords the product protection from undue desiccation, and to the warehouseman reduces his requirements of working space. During the war, we received fresh and shipped frozen from each Blast Freezer of 600 square feet, a carload of meat every 24 hours. This was boneless beef packed in 50 lb. telescope cartons. Freezing time averaged 16 hours and the average temperature of the air blast was about —35 F. As shown in Fig. 1.

Unwrapped loose meats, i.e. hams, picnics, bellies, etc. may be frozen in the blast freezer with elimination of desiccation or freezer burn and reduction in shrink. The freezing of picnics is shown in Fig. 2. The thermocouple at the center showed that the internal temperature had reached —4 F. in 9 hours. The air blast ranged from 0 to —35 F. but most of the time was below —20 F.

Inasmuch as extremely low product temperatures aid the water dipping and glazing operation, naked products, water dipped and glazed immediately following freezing, when subsequently defrosted present a very satisfactory appearance. Color and flavor are little impaired—weight loss is reduced—general quality is comparable to fresh.

Factors to Consider

Many factors must be taken into consideration in the freezing of foods. Time, temperature, humidity, handling and sanitation, each is an equally important detail demanding careful study. The warehouseman cannot assume that product tendered for storage has previously received proper handling and processing. Therefore, a general inspection upon receipt is suggested as advisable. It may afford a protection to the warehouse against the possibility of future claims and declares to the storer a prevailing condition. The storer thus advised of an unusual condition of the product may proceed to make proper distribution with a minimum of economic loss or without detriment to his brand name.

Occasionally, shipments of product are received in a partially defrosted state or with internal temperatures higher than desired for frozen products. This is particularly true with product in route for a number of days. When such a condition prevails there is only one procedure to follow—SPREAD AND HANDLE AS FRESH. Until improved equipment and methods are available for transporting frozen products over great distances, we will be faced with this condition.

Blast Freezer Cuts Time

During the warmer seasons it is common to have offered for freezing and storage abnormally high temperature products. A heavy volume of this type increases the requirements of available spreading space, unless blast freezing facilities are available. Further, it reduces the quantity that may be spread for freezing in a given freezer room. Freezer or cooler temperatures that fluctuate too greatly are not conducive to good storage conditions. There is a noticeable increase in freezer burn and its attending shrink on product previously frozen as well as on fresh product spread for freezing. Humidifiers may partially combat this condition, but the practice of overloading rooms should be eliminated.

In the freezer rooms, proper methods must be always applied. Dunnage as an example, in spreading product for blast or still air freezing, has definite requirements as to placement and dimension if adequate air circulation for the acceleration of heat transfer is to be made available. Such dunnage

should be placed so as to channel, and not to interrupt, the anticipated air flow, and so that the space between product be such as to permit reasonably free air flow. This spreading technique of a plant in handling fresh product to be frozen is one of the most important functions in the entire freezing process, and to achieve the desired result requires consideration of every factor, the initial product and freezer room temperatures, humidity, type of container, physical properties of product, size of the package or the product, and other conditions.

In the handling of product after freezing, extreme care should be exercised in determining when the product should be repiled. The internal product temperature is the only sound determining factor. An experienced freezer man should obtain it from the testing of sufficient representative samples. Repiling prematurely may result in a total loss. Repiling should be accomplished quickly—to delay exposes unnecessarily, a large portion of the surface area of the product thus subjecting it to more rapid desiccation.

Humidifiers Needed

High relative humidity is extremely essential in freezing and storage rooms if desiccation is to be held to a minimum and a more natural color or bloom preserved. Rooms having high quantity turnover and insufficient piping for refrigeration, result in higher refrigeration expense, and poor storage conditions. This combination necessitates an excessive spread in temperature between the refrigerant and the air, and consequently produces lower relative humidity. The installation of additional piping may not be practical; therefore, it is suggested that humidifiers be used where these conditions prevail. Research has repeatedly proved that low temperature high humidity freezing and storage is essential, if warehouses are to render quality of service expected of the Industry.

Eric Johnson said, "The best quick test of the efficiency of any plant is its general housekeeping." Good housekeeping and sanitation go hand in hand with good results. Since common sense must be a part of our daily routine, the time taken to instruct and train employees in good housekeeping and sanitation pays dividends. Operating costs indicate that clean, well kept orderly plants, operate more economically and efficiently than disorderly plants.

Equipment, docks, elevators, vestibules and all places possible should be thoroughly scrubbed at regular intervals with the use of a good detergent properly applied. Freezing and storage rooms should be kept free of litter accumulation. When not in use, dunnage should be placed in racks. Activated charcoal air purifiers should be used to absorb odors that are occasionally given off by products in storage. Products received in packages needing repair should be repaired and the expense charged to the storer. When handling naked or unwrapped product, employees should wear clean frocks and gloves. Warehouse truck equipment must be kept always sanitary.

Quick Handling Essential

Product fresh or frozen must be handled and transported in the plant with dispatch. Planning and coordination of house and dock gangs are essential. Bacteria, which during this comparatively short interval is ever present, responds to a degree in growth. This is especially true if humidity is high and causes condensation on the product surface as bacteria needs moisture for growth and multiplication. Mold growth continues at temperatures as low as plus 17 F. Therefore, if plant handling is not prompt, a loss of quality may result.

Every individual in a warehouse should be thorouhlgy instructed to handle all products with the utmost care and dispatch. We have accepted a responsibility in receiving product for freezing and storage and the success of our industry depends upon how well we carry out that responsibility. TIME, TEMPERATURE AND HUMIDITY along with good warehouse practice may well be the watchword. It is the warehouseman's moral responsibility to protect both storer and product at all times.

S S S

150,000 FROZEN FOOD UNITS NEEDED BY RETAILERS OF FOOD

RECENT Department of Commerce figures indicate that only 40,000 of 600,000 retail food stores now have equipment designed to store frozen foods at zero temperatures. The refrigeration industry has established 150,000 retail storage and display units as the current requirement of general food stores, department stores with food departments and stores that handle frozen foods only. Part of this production would go to stores already selling frozen foods, but it is believed that there should be sufficient output to provide equipment for 25,000 to 50,000 new stores.

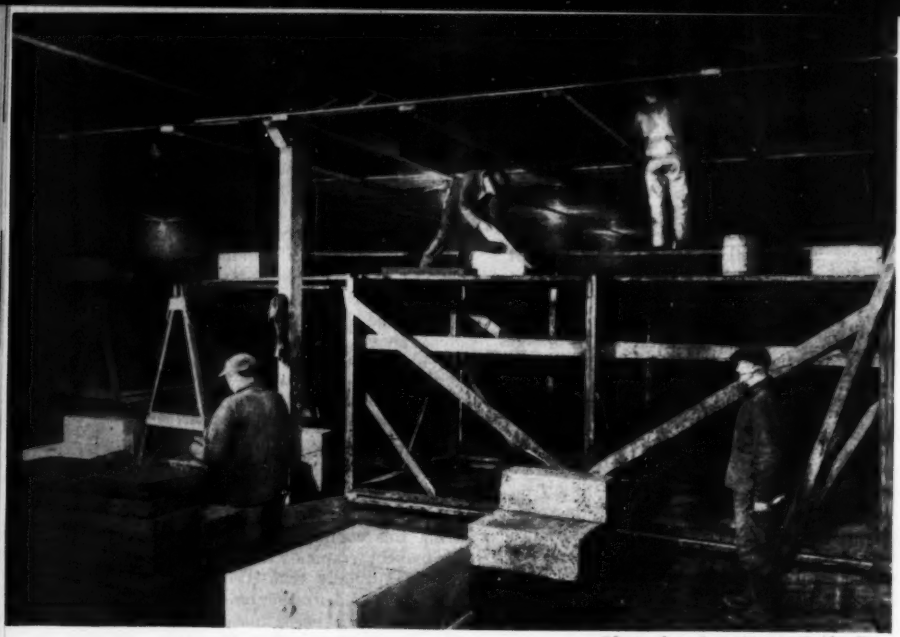


Photo by Armstrong Cork Co.

Applying insulation to the suspended ceiling.

Constructing Suspended Ceilings*

WHEN CONVERTING existing space to cold rooms, it is often advisable to install suspended or false ceilings to obtain the most efficient use of cold storage space and refrigerating equipment. Suspended ceilings realize savings in the initial cost of insulation, but more important, refrigeration costs are cut by the elimination of surplus ceiling space.

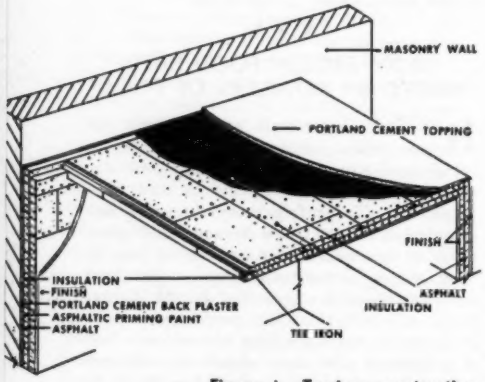


Figure 1. Tee-iron construction is simplest and most widely used.

Factors Governing Ceiling Construction

There are several types of construction from which to choose when building these ceilings, the final selection depending on the design of the building, the use to which the new area is to be put, and the type of evaporating system to be used. Suspended ceilings usually support insulation materials only and are not load bearing in the same manner as other types of ceilings. The main factors to consider are (1) the ease of construction, (2) the span of the room, and (3) allowance for proper ventilation of the space between the old ceiling and the new. Ventilation is particularly important because of the danger of condensation and the accumulation of water which in time will damage the structure. For this reason provision must always be made for the free circulation of air, usually accomplished by the installation of louvers.

* By Armstrong Cork Co.

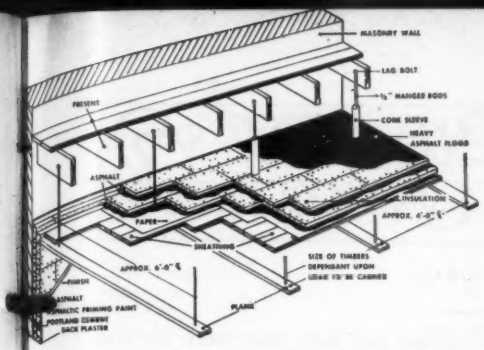


Figure 2. Wood sheathed ceiling on planks, hung on hanger rods.

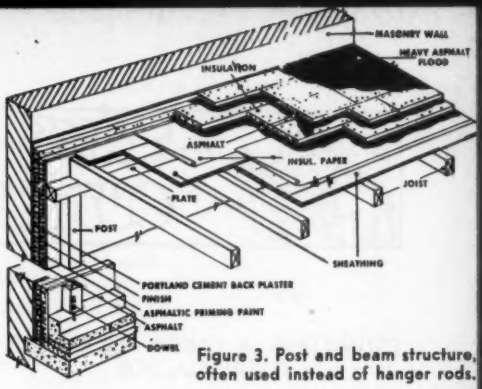


Figure 3. Post and beam structure, often used instead of hanger rods.

Where the area has a nominal span, probably the most widely used and the simplest of the false ceilings to erect is the tee-iron construction illustrated in Fig. 1. In this type the tee-irons, usually about 20′ or less in length and placed on 12″ or 18″ centers, are supported by the inner layer of the wall insulation as shown in the diagram. The first layer of insulation is placed between the tee-irons, the edges being notched to fit snugly the flanges of the tees. As the work progresses the top of the insulation is flooded with a heavy coat of hot asphalt and, to give structural stability, a 1″ course of portland cement topping is applied. The second layer of insulation is then applied on the under side. Occasionally tee-irons are used where spans are greater than twenty feet. In this case hanger rods are used in conjunction with the tee-irons.

Another construction is the wood sheathing ceiling supported by planks hung on hanger rods. As shown in Fig. 2 the insulation is applied on top of the sheathing and joins the wall insulation in staggered joints. In many cases the supporting planks are erected first and the sheathing and insulation applied progressively at the same time. This eliminates the necessity of workmen having to install the insulation in the cramped space between the old ceiling and sheathing.

Where it is not practical to use hanger rods a post and beam structure can be built within the room and the sheathing applied on ceiling joists, anchored to the beams. See Fig. 3. In this case, too, the insulation and sheathing can be applied progressively. Ceiling and wall insulation must meet in staggered joints.

Metal decks are also used and several companies fabricate specialized shapes and erection material for this work. Generally, metal decks are installed so that the flanges

(Continued on page 78)

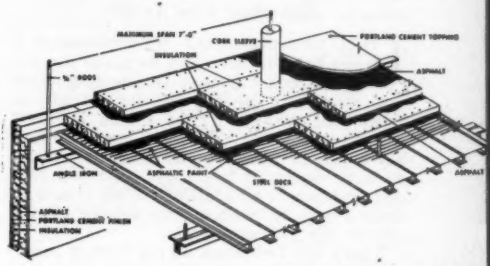


Figure 4. Metal decking materials are fabricated by several companies.

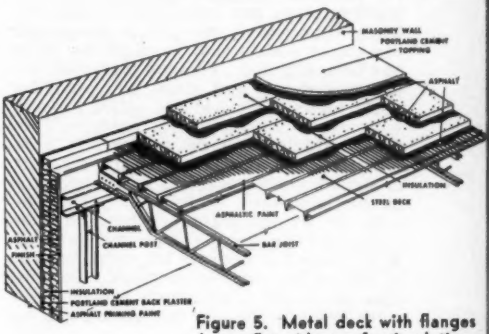


Figure 5. Metal deck with flanges down; flat side up for insulation.

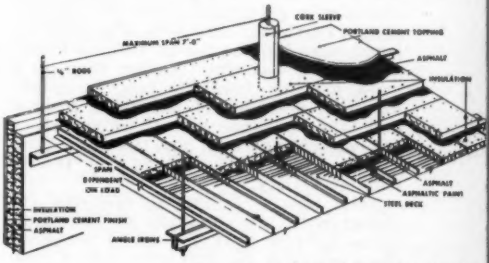


Figure 6. Metal deck with insulation applied within exposed flanges.

By DONALD F. DALY

ESTIMATING A LARGE REBUILD OR OVERHAUL JOB

(Continued from August)

I HAD now completed my estimate so I went back to the shop to make my report. I suggested that the boss go out and check my figures; but he thought it wasn't necessary. That I had covered every possibility. He told me to have my estimate sheets typed up in triplicate so that we could use them as a job record and as a specification. After this was done I was to present my figures to the owner for his approval.

There are two reasons for typing these estimate sheets and using them as a job record and as a specification. It shows the plant owner just what you are contracting to do, and how much it will cost. Many times, after the job is completed, the owner claims that some of the work has been slighted. You can then take the estimate sheets and show him point by point just what work was called for and what work was done. It protects both the contractor and the owner. If additional work is ordered after the contract is signed, such work will be charged for at the usual rate. It frequently happens that an owner wants certain changes made and he usually tries to get such work done for nothing by claiming that it was in the original contract. Be sure that the owner understands that you are contracting to do only the work listed on the estimate sheets.

Another important point in using these sheets as a specification for the job is—in this particular case some sharpshooter could have bid the job in without knowing that it was wet. Rather than do a good job and take his loss, he might dump in a couple of quarts of alcohol and take a chance that the pressure of the refrigerant would hold the water back until he could collect on the job. It happens every day.

Take plenty of time to acquaint the owner with the condition of his plant. If he believes that you are a conscientious operator he may give you a free hand. If your reputation will stand it, give him names and telephone numbers of people you have done work for and insist that he call them. And, above all, make sure that your competitors are bidding on the same amount of work that you are. Some operators figure on giving a job a "shave and a haircut" and let it go at that. If the owner won't do business on these terms, pass the job up. You'll lose your money and your reputation if you don't.

Sixth Article

Continuing from the August issue with his article on estimating the cost of overhauling a commercial system, the author this month shows the estimate sheets used on the job, describes the actual work done and compares the recap of the actual costs with the estimate.

The next day I called the owner of the plant and made an appointment to see him. He wanted me to mail him the bid, but I explained that it would be neces-

Estimate Sheet—1
Reach-In Box

	Hours or Cost per Unit	Total Cost
Material:		
4—door latches	$4.50	$18.00
6—door hinges	3.75	22.50
160 ft.—door gasket	.15	24.00
Total		$64.50
Labor:		
Hardware and door gaskets	32	$ 80.00
Clean and shellac gratings	16	40.00
Total		$120.00
Total material and labor		$184.50.

Estimate Sheet—2
Self-contained Units

	Hours	Cost
Water Cooler:		
Cleaning unit	4	$10.00
Ice Cream Cabinet material:		
Seal		2.75
Exchange valve plate		3.25
Gaskets		.50
Total		$ 6.50
Ice Cream Cabinet labor:		
Cleaning unit	4	$10.00
Overhauling compressor	4	10.00
Total		$20.00
Salad Tray material:		
Motor overhaul		$18.00
Expansion valve		9.50
Total		$27.50
Salad Tray labor:		
Cleaning unit	3	$ 7.50
Motor and expansion valve	3	7.50
Total		$15.00

sary for us to go over the estimate together. He told me to come out right away. When I presented my estimate sheets he reacted in characteristic fashion. "What are you guys trying to do," he stormed. "Make it all on one job? Your bid is over $400.00 higher than the next highest bidder.

I had expected this and asked to see the bids that had been submitted by other contractors, so we could compare the amount of work and material for each bid. He showed them to me, but there wasn't much to be seen. None of the bids were made out in detail and there were no specifications to show just what work had been included. And in none of these bids could I find any evidence that the bidder had taken into consideration the fact that the system was wet.

I pointed this out to the owner, and I also gave him a little information about the effect of moisture in a refrigeration system. He was noncommittal, but wanted to know if the bid we were submitting covered every part of the plant, and if we would guarantee that this amount of work and material would put the plant in first class operating condition, and that there would be no extras. I had to say no to this. I explained that the estimate was based on my considered judgment, and that, so far as I could de-

Estimate Sheet—3
Refrigerated Rooms

	Hours or Cost per Unit	Total Cost
Material:		
One hinge		$ 6.50
One door latch		16.50
200 ft.—door gasket	$ .15	30.00
3 gal.—shellac	6.00	18.00
Total		$71.00
Labor:		
Install hinge and door latch	4	$ 10.00
Install door gaskets	12	30.00
Cleaning rooms	40	100.00
Shellac rooms	16	40.00
Total		$180.00
Total material and labor		$251.00

Estimate Sheet—4
Refrigeration System

	Hours or Cost per Unit	Total Cost
Material:		
Overhaul motor (sub contract)		$ 65.00
5—85" belts	$2.75	13.75
145 lbs.—Freon-12	.52	75.40
Valve plate exchange		37.50
2 suction reeds	.80	1.60
One set piston rings		6.60
One set compressor body gaskets		3.20
5 gal. oil (two changes)		5.00
One Alco valve power element		12.00
One solenoid valve with coil		13.50
3 valve cages	2.25	6.75
Total		$240.30
Labor:		
Remove and replace motor	4	$10.00
Overhaul compressor	12	30.00
Check, test and prove system	16	40.00
Total		$80.00
Total material and labor		$320.30

termine, every necessary repair had been included. I also pointed out that I had no way of seeing inside the coils and fittings and since the plant was not operable, I didn't know what we would find in the way of defective and worn out controls and parts. If I made the esti-

Estimate Sheet—5
Cleaning and Drying System

	Hours or Cost per Unit	Total Cost
Material:		
One new water cooled condenser		$228.00
12 bottles nitrogen	$5.00	60.00
40 lbs. silica gel	.60	24.00
Total		$312.00
Labor:		
Install new condenser	8	20.00
Cutting lines, blowing out, etc.	64	160.00
Tending vacuum pump and scrubber	40	100.00
Total		$280.00
Total material and labor		$592.00

Estimate Sheet—6
Total Labor and Material

Material:		
Reach-in box	$ 64.50	
Self-contained units	16.00	
Refrigerated rooms	71.00	
Refrigeration system	175.30	
Cleaning and drying system	312.00	
Total		$ 638.80
Motor work:		
7½ horsepower motor	65.00	
½ horsepower motor	18.00	
Total		$ 83.00
Labor:		
Reach-in box	120.00	
Self-contained units	45.00	
Refrigerated rooms	180.00	
Refrigeration system	80.00	
Cleaning and drying system	280.00	
Total		$ 705.00
Total material, labor and motor work		$1,426.80

mate so all inclusive that it covered every single item involved, the price would be prohibitive. I was of the opinion that our bid covered everything required, but if any additional work developed it would call for a charge at the usual rate.

I suggested that he check with the other contractors to find out if their estimates covered the same things that ours did, and if they too were guaranteeing their work on the basis he mentioned. I also gave the telephone numbers of people we had done work for and asked him to check our reputation. He said he would think it over and let us know.

The next morning we had an O.K. to go ahead with the job at once. I don't know how much checking this man actually did, but I do know that the detailed bids and the time spent in explaining the terms and conditions of the bid, were instrumental in getting the job. Even though we were quite a bit higher than our nearest competitor. This man was unhappy because he thought he had been cheated by the contractors who did his remodeling work, and he was glad to find someone who would lay it on the line to him. It takes a little time to make up these detailed estimate sheets and to explain them to the customer, but they pay off in the long run.

We started the job on Monday morning and for the first week we had four men. One refrigeration fitter (myself), one helper, one laborer, and one carpenter to put on the door gaskets and the hardware. All of the material was to be delivered that morning so there would be no delay on that count. I started the carpenter to work on the gaskets and hardware, and the laborer to scrubbing out the boxes. There was plenty of hot water and soap and I borrowed some stiff brushes from the janitor. Each room had a drain so it didn't matter how much water was spilled. He could scrub down a section and then wash it off with a hose. It worked out better than I thought it would.

The first thing my helper did was to remove the two motors so the truck driver could take them to the electrical shop when he came to deliver the material. We wanted them back as soon as possible. The next step was to blow out the lines and coils with nitrogen. We hooked on to the charging valve, isolated the condenser and compressor, and used two bottles of nitrogen to blow through the entire system. We removed all of the expansion valves and just let the nitrogen and water come out wherever it would. We got some free water on this first blow, but not as much as I expected.

Next we cut the suction lines at each coil and blew each one separately. Most of the water seemed to be in the meat room coils. It was closest to the unit and the largest coil by far. We used six bottles of nitrogen on these coils. The remaining four bottles were used on the other coils. The two finned coils in the reach-in box showed no evidence of water. Maybe it wasn't going to be as bad as I expected.

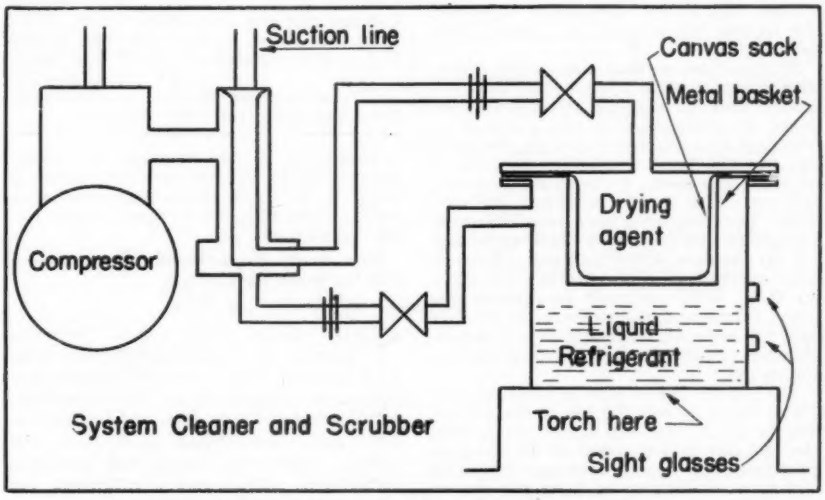
It took us two days to blow out the coils, and another two days to hook them up again. As soon as we had them all hooked up we put a vacuum pump to work on the system. Except for oiling these vacuum pumps require very little attention. I made arrangements with the hotel's night watchman to check and oil the pump so we could get continuous operation. We put a vacuum gauge in the line, and after a few hours the gauge showed about 28" of vacuum, so there didn't seem to be any leaks.

While this was going on we changed the condenser. I had figured on eight hours for this work, but the outlets were different from the old one, so it took sixteen. When we got the condenser installed I cut it into the system and pulled a vacuum right up to the service valves of the compressor. After the second day I broke the vacuum at the high point of the system and allowed it to fill up with dry air from the kitchen.

The next step was to overhaul the compressor. We had to take it apart to clean the oil and sludge out of the crankcase. Incidentally, there must have been two gallons of water in the crankcase. We washed it out, first with solvent, and then with carbon-tet. The piston rings didn't seem to be very bad, but we put the new ones in anyway. We also put in new suction reeds, a new discharge valve plate, all new gaskets, and fresh oil. By that time the motors were back so we hooked it up and installed the scrubber. To install the scrubber we had an adapter that fitted right into the suction service valve body. When this was done we broke the vacuum with Freon and put in what I thought was a full charge—about 125 pounds. It was almost quitting time so we decided to wait until the next morning to start scrubbing the system.

How to Use the Scrubber

For the benefit of those who have not used a system cleaner, or scrubber, it might be well to offer a few words of explanation. This particular scrubber was made by the York Company, and it was a honey. The purpose of these scrubbers is to circulate the refrigerant through the system and over the drying agent as rapidly as possible. You operate with all expansion valves wide open and the tendency is to flood back. One man has to stand by with a torch to see that liquid does not flood over into the crankcase. After the scrubber has been on a while you gradually close the expansion valves, and adjust the controls, until the plant is operating normally. If, after a time, the expansion valves do not freeze up, it can be assumed that the system is free of water. In this instance, where we had other work to do, we could flood the refrigerant through the scrubber for a couple of days, and then put it on normal operation for as long as seemed necessary. It sometimes occurs that water is trapped in a coil, even after it has been blown out and scrubbed. For this reason it is a good idea to keep the scrubber on



Isometric sketch of York scrubber connected in the system.

as long as possible. It is also a good idea to open up the expansion valves for a few minutes and slug the refrigerant through one coil at a time. This can be done after the plant is put on normal operation. I have dried up a lot of wet systems by using these methods. It takes time and you have to follow the procedure that is best adapted to the situation, but it does work.

We changed the silica-gel in the scrubber three times the first day, twice the second day, and once each for the next two days. We got some moisture the first day, but after that I couldn't see much evidence of water. But I wanted to play safe. We were only running the scrubber during the daytime. I was afraid to trust the hotel's night watchman. We had to keep a torch on the scrubber body most of the first day, but after I began to cut the expansion valves back it didn't need much watching.

The Self Contained Units

While this was going on I worked over the three self contained units. The water cooler just needed cleaning, and the ice cream cabinet was about as I had figured, but the salad tray gave me a little trouble. The coil was loaded with oil and it flooded back badly, even after I put on the new expansion valve. I tried re-locating the expansion valve bulb, but that didn't take care of it. I don't believe it had ever worked very well. If I pinched the expansion valve it wouldn't get cold enough, and if I opened it up it flooded back to the compressor. I solved the trouble by putting in a small heat exchanger.

By this time we had everything pretty well under control. My helper and the laborer had the cleaning all done and the boxes all shellacked. I had planned on bringing in a painter to put on the shellac, but the boys wanted to do it, so I let them go ahead. I closed all the doors and started to set the switches and controls. They required very little attention. I changed two expansion valve cages and put on one new power element. The solenoid valves and room thermostats were all O.K. We continued to operate the plant through the scrubber for another day, but with all the controls and expansion valves set in their normal operating range.

We had no indications of moisture and I was ready to sell the job to the owner. We took the scrubber out of the system the last day and changed oil in the compressor again. I made arrangements with the night watchman to keep his eye on it that night, and the next day I asked the owner to pass on it. He didn't do this himself, but sent an engineer. (A very unhappy guy, but not a dumb one.) The engineer was satisfied with everything and gave us a clean bill of health.

When I came to total up the time and material used I found that we had come out fairly well. I had been over on some things, and under on others.

Recap of Completed Job

I didn't have a chance to check the material lists after the job was completed, but I imagine the figures were pretty close to the estimate. The only additional material used was the heat exchanger on the salad tray. However, I do have the figures for the labor. When the job was completed my time book showed the following totals.

Carpenter	40 hours
Laborer	80 hours
Helper	96 hours
Fitter	96 hours
Total	312 hours

My estimate for labor had been for 282 man-hours, so I had run over by 30 man-hours. This wasn't too bad. Even if we had been paying the journeyman rate for every man employed. That would have meant a loss on the labor of $75.00. But the actual figures for the amount paid out for labor were as follows:

Carpenter, 40 hours at $1.75 per hour	$ 70.00
Laborer, 80 hours at $1.00 per hour	80.00
Helper, 96 hours at $1.25 per hour	120.00
Fitter, 96 hours at $1.87½ per hour	180.00
Total cost for labor	$450.00
Total estimated for labor	$705.00.

That left a fair margin of profit. Slightly under the standard 40% mark-up rate. If the same percentage held true for the material, the company made out all right on the job.

Next month the author discusses contracts with the dealer for service.

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SINCE frozen foods appear to be a "natural" for establishments with large food facilities, industry leaders envision new equipment demands from 6,400 hospitals, 4,750 industries with their own cafeterias, 7,000 golf, country and social clubs, 700 colleges, 2,000 state, county and municipal institutions, 1,700 penal institutions, and others which total 25,000 for the country.

Control of Refrigerant Feed With Electric Eye

By LEROY ETZEL*

Here is an interesting method of controlling the refrigerant level in the larger ammonia lowsides with an electric eye. It is doubtful that the method can be used with other popular refrigerants but it offers a new thought in control methods.

IN DESCRIBING the development of refrigerant feed with an electric eye perhaps it might be well to briefly describe the operation of the different evaporator coils which necessitated a positive control. We will exclude the short pass coils with float control, which is positive, and does an excellent job of regulating the flow of liquor to the evaporator.

Some plants still use the hairpin bend type coils in ice tanks; originally these were controlled with an expansion valve at the top of each coil and the suction taken off the bottom. Some of the younger operators can imagine the problem in trying to maintain temperatures with such an arrangement. Next came the addition of a header at both the top and bottom of the coils, which included several stands. The liquor was fed into the bottom header and the gas taken off the top one.

All the flash gas, plus that produced by ebullition of the liquor, caused slugs of liquor to come over to the machines with its consequent packing and lubrication problems. To overcome this an accumulator or trap was installed above the tank and a drain allowed the entrapped liquor to return to the tank. The gravity type fed the liquor

* General Superintendent of Refrigeration, Pacific Fruit Express Co. Presented at the 37th Annual Convention, NAPRE.

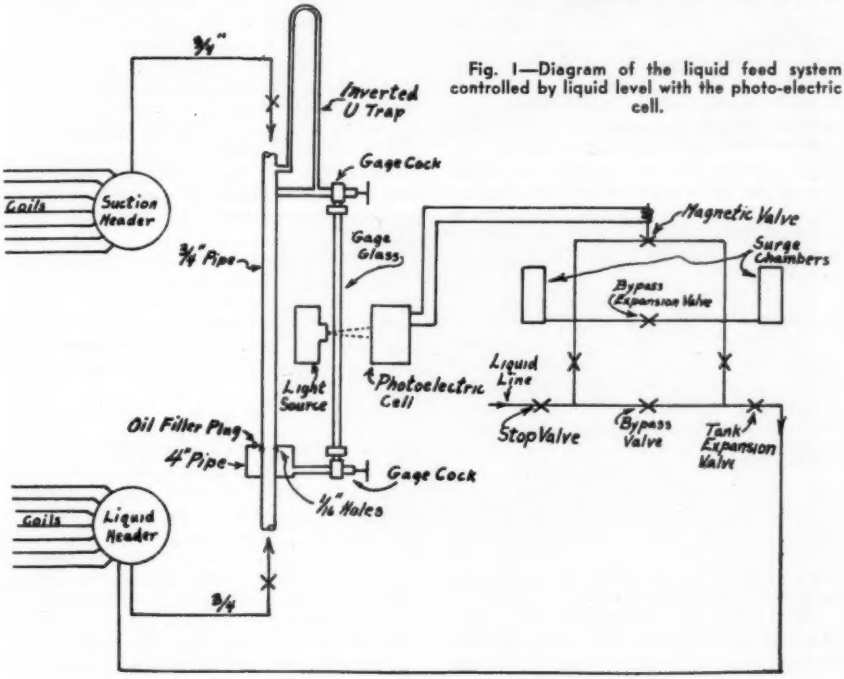


Fig. 1—Diagram of the liquid feed system controlled by liquid level with the photo-electric cell.

into the drop leg and allowed the flash gas to return to the compressor without going through the long coil, which resulted in more wetted surface.

Even with the accumulator there was no visual means of determining where the liquid level stood, and therefore the engineer had to watch the frost line on the machine manifold and adjust the expansion valves accordingly. The welding of pipe stubs to extend through the insulation at different heights on the accumulator helped to determine the level as those below the liquid level would show frost. The engineer had to continually watch the frost line to determine how to adjust the expansion valves. On a cooling tower job where head pressure varies he was constantly opening and closing valves to keep the machines operating satisfactorily.

A Visual Liquid Level

Some visual means of knowing where the liquor level stood in the tank was needed for the best operation of the system. This was solved by Chas. Bull, Manager of the P.F.E. plant at Colton, Calif., who devised a gage glass which balanced the liquid head in the tank against a column of oil in the glass. It consists of a ¾ in. pipe connected to the bottom header through a valve and the top connected to the suction line above the tank through another valve. Around this pipe, opposite the bottom header, is welded a cylinder of 4 in. pipe, 4 in. high. Near the top of the cylinder four 1/16 in. holes are drilled through the ¾ in. pipe. Near the bottom on the side of the cylinder a gage glass cock is mounted, and approximately 30 in. higher on the ¾ in. line another one is mounted as shown in Fig. 1.

The pot is filled with ice machine oil and as ammonia flows out of the holes on top of the oil, the oil rises in the glass in proportion to the height of the ammonia in the tank. The inverted "U" tube is to eliminate any chance of ammonia flowing from the suction side of the gage pipe into and on top of the oil in the glass.

By experiment one can determine how high the oil can rise before the accumulator allows wet gas to freeze up the machine. A marker or string is placed at this particular point, the engineer now knows when the tank is pumping out or is getting too full and can remedy the condition as fast as it occurs.

The control still is dependent on the operator and should he be away from the compressor room any length of time the tank can either pump out or become too full.

By installing a solenoid operated stop valve ahead of the expansion valve with bypass valves and surge chambers as shown to the right in Fig. 1, and using the oil to disrupt the light source on a photo-cell, the control is entirely automatic.

Valve Setting

The expansion valve is set to allow slightly more liquor to flow in than is evaporated, this causing the level to raise which closes the solenoid valve when the light beam is disrupted. The expansion bypass valve around the magnetic valve is set so it does not feed as fast as the liquor boils off, which slowly allows the oil level to lower until the light beam is restored and the magnetic valve again opens. With this hook-up the magnetic valve acts as a regulating valve and its operations are greatly reduced. The function of the surge chambers is to eliminate the hydraulic hammer, which occurs both when the valve opens and closes.

One particular plant with 4086 300-lb. cans, equipped with a photo-cell on each of three tanks and one on the forecooler, is producing 514 tons daily with cooling tower operation. As far as the ammonia cycle is concerned, it is entirely automatic. In addition to the control of the low side with photo-cells, a Mercoid switch is held closed as long as water flows to the condensers—in case of water failure two 500 hp. motors are shut down automatically.

During the war years when experienced men were not available we were able to get maximum production with inexperienced operators.

Other installations which have been greatly improved are those where the ice tanks are located on the third floor and the compressor room on the ground floor. Only periodic trips are necessary to take temperatures and check light sources for burned out globes.

S S S

RAILROAD officials report that nearly 10,000 new refrigerator cars were on order as of March 1, 1947, with "a good guess that around 600 will be super insulated and equipped for shipping frozen foods." Frozen food authorities, however, say that the need is for at least double the 1500 cars now being used for frozen food transportation, many of which are not adequately insulated or equipped, and that 2,000 new refrigerator cars could be used.

Mobile Ice Skating Rink Is Built Under Unusual Space Limitations

PATRONS of a New Orleans' night club recently were startled to see an ice rink where they had just been dancing. They were seeing for the first time one of the few retractable ice rinks in the country. Operating for two and three shows daily in the Blue Room of the Roosevelt Hotel this disappearing ice rink was installed despite severe space limitations requiring a departure from previous engineering techniques.

On the surface, the problem of installing a disappearing ice rink, one that would retract under the bandstand when not in use and roll onto the dance floor in a matter of a few minutes, seemed fairly simple. However, a survey of the space allotted for the bandstand and dance floor disclosed that there would be little room for plumbing and refrigeration equipment.

The stage was to be located against an outside wall of the hotel, and due to space limitations, the rink, when retracted, had to almost touch the back wall. Moreover, all available space on the sides of the stage was occupied by dressing rooms and service area.

The Equitable Equipment Co., New Orleans, solved the problem by designing a rink approximately 21 ft. square with scalloped outside corners built to fit snugly around the building columns, when the rink is extended. Direct expansion coils are built into the rink itself.

Space limitations were overcome by maintaining a clearance of twelve inches be-

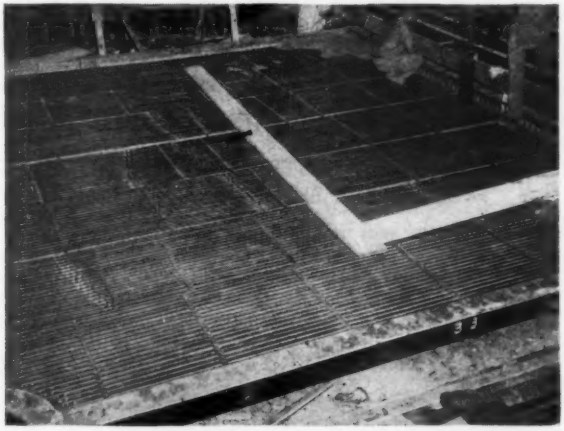


Fig. 1—A construction photo showing the piping in place and the edge of the steel pan. Sand was later filled in around the coils.

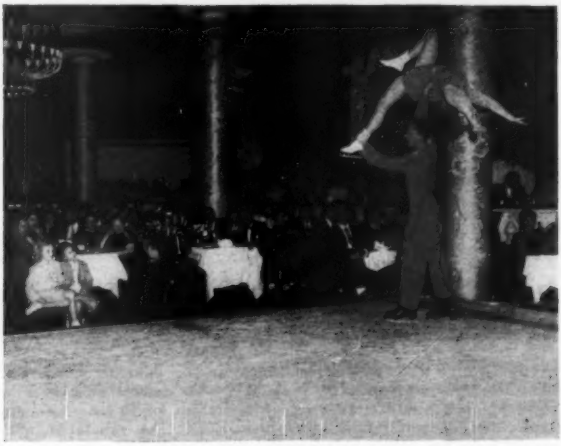


Fig. 2—The mobile ice rink in use.

tween the back of the rink and the rear wall. Liquid and suction headers, expansion valves and connections for flexible hoses were located in this limited space. The compressor and condenser were located in a basement equipment room, one floor below and 30 ft. to one side. Flexible metal inserted composition hose connections are used for the 30 ft. of liquid and suction lines.

The bandstand is constructed of steel framing, completely spanning the rink. Clearance between the top of the rink and bottom of the steel framing was held to seven inches. Seven complete coil assemblies were constructed, each with its own expansion valves and distributors. Each coil consists of 20 lengths of tubing, on 1¾ inch centers, with lines terminating in headers constructed to allow each of the seven coils equal distribution of refrigerant.

The coils are set in a steel pan of heavy gauge steel with 4 inches of cork insulation, and lined with 24 gauge galvanized iron with soldered joints. Sand covers the coils and is saturated with water for freezing. When this base freezes the height of ice is easily built up to a two-inch depth.

The pan is mounted on 44 ball bearing rollers, 20 inches long, evenly spaced to spread the load and each equipped with an individual adjustment to correct for uneven spots in the dance floor. The rink is operated by a cross shaft, with a drum and cable on each side, and driven by a 1 hp. back-geared motor, giving an operating speed of about 22 ft. per minute. Limit switches at each end of travel stop the rink at desired points. Control of the temperature is provided by a suction pressure control, designed to cut in at 21 lbs. and cut out at 12 lbs.

FROZEN ROSE BUSHES

IN ONE of the most unusual applications of commercial refrigeration equipment, Howard & Smith, well-known nursery of Montebello, Calif., has found the use of "Recold" water defrost evaporators ideal in helping the nurserymen to develop a method of retarding root action of certain plants through frozen refrigerated storage.

Dealing primarily with roses in their experiments, Howard & Smith have found that by storing the rose plants in a huge low-temperature refrigerator equipped with

Highlighting a definite advancement in the field of commercial refrigeration, this photograph illustrates the installation of "Recold" water defrost coils in a low temperature walk-in storage room which is used exclusively for the storage of frozen rose bushes by Howard and Smith, well known nursery operators in Montebello, Calif. The installation which was first made on an experimental basis has proven so successful that a much wider market for the florist industry is predicted. Installation was made by distributor of Refrigeration Engineering, Inc., Los Angeles, Calif.

"Recold" water defrost evaporators and maintaining constant low temperatures, they can completely arrest root action of the plants through a freezing process.

By storing slips and plants at a low temperature, the flow of sap is stopped and the starch content is equalized, with the result that when the plants or slips are taken out and planted or budded, a more even growth and much faster development are achieved than through natural processes.

To the retail florist or nurseryman who buys his supplies from wholesale firms such as Howard & Smith, the use of a similar method in his place of business will enable him to keep plants of many hardy varieties, as well as bulbs, for a period of from 90 to 120 days in a completely static condition. Thus stocks may be drawn from the refrigerator as needed, with the assurance that customers will receive better plants and healthier starts. Actual tests disclose that plants set out in January in the normal method are somewhat slower than those set out 90 days later, after having been through the refrigeration process. In making an actual comparison, it was found that the plants subjected to refrigerated storage will be as large or larger than those set out in the regular way, by July 1st.

Another point which is worthy of consideration is that, because the freezing process equalizes the flow of starch through the stem, a more even, regular growth of the plant is maintained. Thus a more uniform garden is possible.

From the wholesaler's standpoint, the method has many advantages. In the case of Howard & Smith, who handle more than one million roses a year, the problem of distribution and handling all of these within the short time necessary, under natural conditions, made it almost impossible to take care of the requirements of all their local customers as well as their Eastern markets. By the use of the freezing method, they can easily take care of their local trade in the early part of the year, and as Eastern markets open they can make shipments as much as three or four months later without detrimental results.

This experiment is another first in "Recold" development and it marks a very forward step in the future of the nursery business and opens another huge market for "Recold" water defrost coils. The Howard & Smith installation was engineered and sold by Bob Fraser of Fraser & Reed Refrigeration Company of Los Angeles.

COOLED WATER BOOSTS MORALE OF RANCO EMPLOYEES

SIX hundred employes, and not one has to walk more than 50 feet to get a drink of cool, refreshing water!

That's the record of the Columbus, Ohio, plant of Ranco, Inc., indicative of a new trend in the promotion of worker efficiency.

Plant managers, endeavoring to compensate for higher wages by encouraging increased efficiency among workers, are turning to water coolers as a means of saving time, boosting morale and bettering employe health, it is pointed out by spokesmen for water cooler companies in the Refrigeration Equipment Manufacturers Association.

Strategic location of cool drinking water supplies throughout a plant materially reduces the time workers must spend away from their machines or desks, it is noted. At the same time, however, the convenience of having cool water a few steps from workers, encourages the consumption of greater quantities of water, regarded as beneficial from the standpoint of health.

The Ranco plant, where electrical controls are produced by a factory staff of more than 600 persons, offers an excellent example of a modern industrial establishment properly equipped with water coolers.

Ranco uses 14 ten gallon bubbler type coolers scattered throughout its plant from lobby and offices to assembly lines and cafeteria. E. C. Raney, Ranco president, says that water coolers ". . . add greatly to the efficiency of our employes in both our shop and our offices."

Additional evidence of the usefulness of water coolers in industrial plants is to be found in the million dollar candy plant recently completed by the Walter H. Johnson Candy company, makers of Powerhouse candy bars. Water coolers, both bottle and bubbler type, are included along with air conditioning and other conveniences for the increased efficiency and health of employes.

The practical advantages of modern water coolers in supplying these benefits in industrial plants easily and economically is adding to the already tremendous demand for this equipment, it is reported.

New water coolers are styled simply and are more compact than pre-war models. Models for various requirements are available and require little attention. Design of bubbler guards, drain bowls and pre-cooling apparatus is such that they are sanitary.

SERVICE POINTERS

A department for the exchange of ideas on new devices and methods of improving service work. Five dollars is paid for each pointer published. Write up your idea today and mail it to the Service Pointer Editor.

GRUNOW WON'T PUMP

IF YOU have had trouble with a Grunow refrigerator which will not pull down to lower than 20 degrees in the evaporator or more than a 22 inch vacuum even though the compressor seems to check perfectly on pulling a static vacuum, try the following.

I had one that the evaporator would just sweat but the compressor would pull an almost perfect vacuum with the suction shut off. I stuck a pointed tool in the suction connection and pierced the screen in the suction line inside the compressor, under the check valve. There was an immediate noticeable difference in the pumping capacity and the machine functioned well.—*Submitted by C. A. Wilhelm, Saratoga Springs, N. Y.*

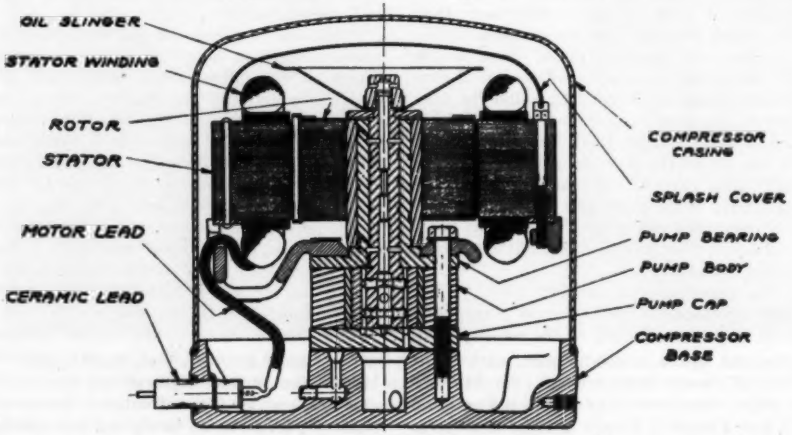
MAJESTIC COMPRESSOR

WHEN rebuilding Majestic compressors and the vanes are found to be worn on the faces, to insure better operation the vane spacing rods should be removed. These are case-hardened pins. Substitute with two lengths of drill rod of proper diameter ground off on one end to give proper fit of vanes to cylinder walls. Allow a few thousandths clearance for metal expansion. Use one grade heavier oil. *Submitted by W. C. Hefferlin.*

DEHYDRATING IN BOILING OIL

THAT old adage "keep the pot boiling," applied to coffee pots, poker games and what have you, can now be applied to refrigeration service because literally that is what is being done.

The pot in this case is filled with boiling oil and where considerable shop work is being done on motors, compressors and other parts in need of drying before assembling, the pot is kept boiling all day. Dehydrating in boiling oil is quicker and easier than in an oven and is well suited to such items as motor stators, rotors, compressor parts and other items which can be suspended in the oil. It is not so suitable to the assembled



Cross Sectional View of Majestic Compressor.

compressor or to any other assembly where the oil cannot reach the internal parts.

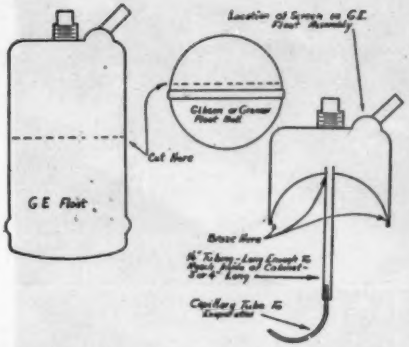
Parts to be dried are suspended in the oil and allowed to remain until all bubbling has stopped, which will usually be about 15 to 20 minutes. When no bubbles appear, the part is dry and ready for removal.

S S S

CHANGING G.E. TO CAPILLARY TUBE REFRIGERANT FEED

CHANGING the General Electric DR1 or 2 high side float refrigerators over to a capillary tube presents the problem of how to provide a charging and purging port usually located in the top of the high side float, and how to provide an accumulation chamber for uncondensables which is also provided by the high side float.

One way of solving the problem is shown in the illustration. Remove high side float and cut it in half, then take the bottom half of an old Gibson or Grunow float ball and invert it into the top half of the G.E. float. Braze it in place and drill a hole in the center for a ¼-inch tube. Braze a three-inch length of tube in this hole and braze the capillary tube in the ¼-inch tube. The

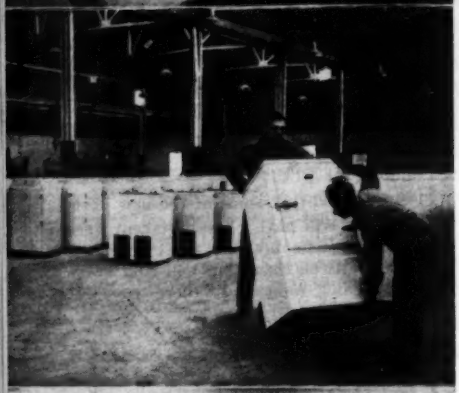


appearance of the unit is not spoiled when the change is made in this manner and you still have the use of the purging and charging port.

S S S

IT IS reported that some of the new post-war tools will have phosphorescent handles. Maybe some day they will get around to having bells on them that will ring every time you can't remember where you left them.

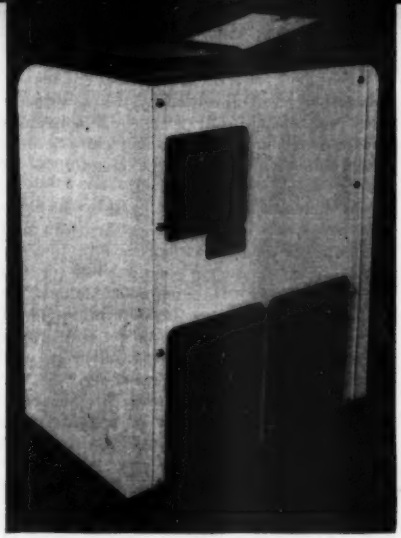
"All right, Joe! Cut out the comedy and tell me—is the light in there on or off?"

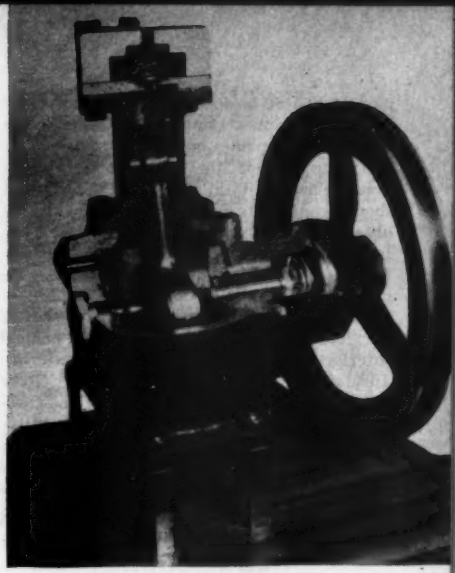


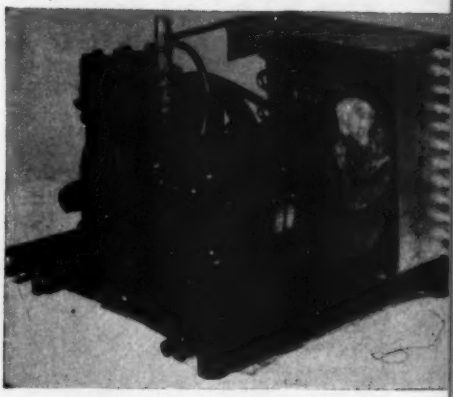
War Born English Firm Converts to Refrigeration

IN A recent letter from E. C. Pounsett, Sales Director of the Longford Engineering Co. Ltd. of Sussex, England, we received a number of photos and a brief account of the activities of our English friends in the refrigeration field. Mr. Pounsett joined Frigidaire when they first began manufacturing in England around 1922, and through this connection gained an insight into American methods of manufacture. "It occurred to us," states Mr. Pounsett, "that our American refrigeration friends would be interested in our activities."

The Longford Engineering Co. Ltd. came into being during the war when they were engaged in turning out parts for the Army and Navy. It is since the war that the company launched into the production of refrigerators for the domestic and export market. The company is now engaged in the manufacture of several different size household refrigerators, turning them out at a rate of about 100 per week. In addition they make home freezers, ice cream equipment, commercial cabinets for hotels, butcher shops and, in fact, a whole line of commercial refrigeration equipment and cabinets. Fifty percent of the production of the company is exported to such countries as Persia, Iraq, East and West Africa, India, Palestine, Spain, Norway and, curiously enough, Iceland.







Early in June of this year the company made its first delivery of refrigerators by airplane, and claims to be the first manufacturer in England using this method of transportation. "We find this a most satisfactory method of transporting," said Mr. Pounsett, "having the advantages of eliminating the damages sustained in road, rail or ship transportation; of eliminating the delays in obtaining shipping allocation; and the necessity for crating the cabinets. In addition, you can well imagine the importance to the distributor overseas who may cable us for a shipment of cabinets and receive delivery of them within a matter of 24 hours, against a normal shipping period up to 3 weeks."

The company owns its own plane, an Auster, which is used for the transportation of executives throughout the British Empire and Europe. Plans are now on foot to use the plane for the transportation of the Service Department Supervisor in his visits to agents throughout Europe. "We find we inspire the faith of our agents by our actions," said Mr. Pounsett, "more readily than by our promises. Our policy is to retail our products through the service engineer, who we invite to our plant to enable them to become fully acquainted with our products. By experience we know our good name rests in the hands of the service engineer.

"The aim of the company," said Mr. Pounsett, "is to produce a really efficient refrigerator with all the luxuriousness of those made in America, and to sell it at approximately the same price as American

Portrayed on these two pages are the activities of the Longford Engineering Co., Sussex, England, a war-born manufacturer who converted to the making of refrigerating equipment. They build their own cabinets, compressors, evaporators, etc., for both domestic and commercial application, exporting 50 percent of their production. In the left hand column, opposite page, top to bottom are shown (1) the cabinet assembly line. (2) A part of the shipping room. (3) Four of the refrigerators about to be loaded aboard an airplane for shipment to a dealer. Mr. E. C. Pounsett is shown at extreme left in the photo. (4) Display room at factory.

An interior view of the refrigerator and a closeup of the freezer is shown across the top. Above is a cutaway view of the compressor made by the company and below it, one of the condensing units used in their cabinets.

models. There is no reason," he said, "why British companies should not compete with American companies on equal terms."

At the moment the company is held up from achieving its ideals by the quality and shortage of materials, and the difficulty in obtaining machinery. Nearly everything has to be done by hand but a good beginning has been made and production is steadily increasing.

The refrigerator now being produced is of all steel construction, white vitreous enamel interior and white sprayed paint exterior. Insulation used in the cabinet is either Fibre-glass or cork slab. Cabinets are carefully shaped in hand presses and welded together with the edges hand filed and blended. Compressors and condensing units are made in another plant operated by the same company where they undergo a rigid inspection and test routine. Final assembly of the unit and cabinet is made at the Bognor Regis plant.

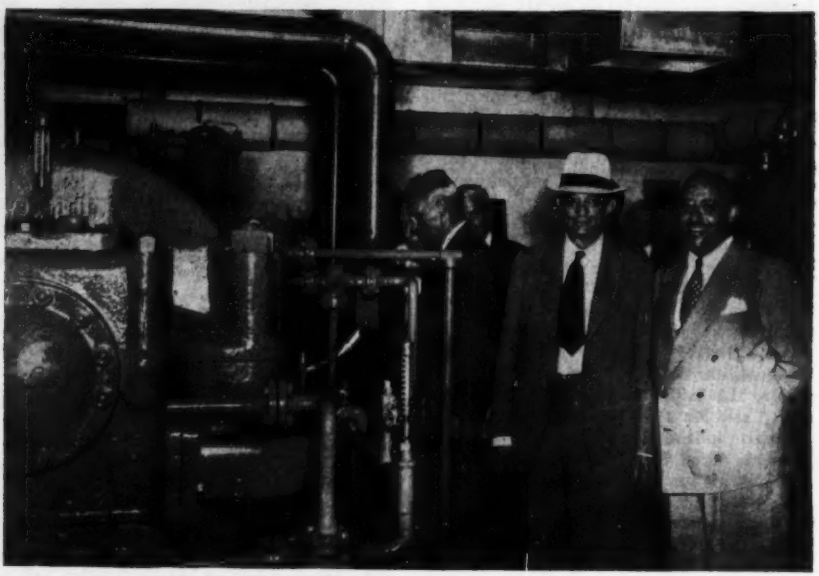
The men and women employed by the company work on a group bonus system whereby each worker does his or her best to increase production. A target board showing the daily production is prominently shown in each department, and the determination of every worker to beat that target encourages production. Rigid inspection, however, prevents workmanship from suffering.

Improvements now planned for the company include the building of a foundry so that the company will be less reliant on outside supplies.

NEW CENTRIFUGAL COMPRESSOR OPERATES ON PROPANE REFRIGERANT

A SUCCESSFUL run-in test of the first centrifugal compressor ever to use propane in a refrigeration cycle—opening a new field of possibilities for the world's oil refineries—was completed recently by Carrier Corporation, leading manufacturer of centrifugal equipment.

Set up as a self-contained, complete package, including compressor and turbine as well as auxiliary oil pumps and oil coolers, the new centrifugal covers a floor area only five feet wide by 15 feet long. Carrier



Dr. Willis H. Carrier, Chairman of Carrier Corporation (left) and Dr. L. M. Goldsmith, Chief Engineer of the Atlantic Refining Company are shown above during their inspection of the first centrifugal to use propane in a refrigeration cycle. The Carrier unit was built and tested in Syracuse, N. Y., and will be installed in Atlantic's new Point Breeze, Pa., plant.

spokesmen reported the unit assured not only great space-saving as against reciprocating compressors, but lower original and maintenance costs as well. The refrigerant —propane—is an inexpensive by-product readily available in all refineries.

The first propane centrifugal, having passed its tests, will be installed by the Atlantic Refining Company in its new Point Breeze, Pa., plant by E. B. Badger & Sons Co., Boston contractors. Atlantic will use the machine in its dewaxing process, in which oil is chilled to approximately 25 degrees below zero in order to congeal and remove the wax base.

Dr. L. M. Goldsmith, Chief Engineer for Atlantic, attended the run-in test. He asserted that Atlantic, in being the first to use the machine, believed that it had a definite place because of its simplicity and greater effectiveness as against reciprocating types.

H. D. Robie, Project Engineer for E. B. Badger & Sons, said after the test that the Atlantic installation presented no particular problems.

"The saving in cost and space makes centrifugal compression an imperative method in the oil industry," Mr. Robie said. "At a rough rule of thumb guess, I would say that as against a reciprocating installation for this job the savings in first costs alone would be around 50 percent and the saving in floor space at least 66 percent."

The Atlantic unit, which has been labeled as Carrier's model 18T300, will have five stages. It is nominally a 2,000 cfm. compressor and operates between the levels of 21 psia. inlet pressure and minus 22 degrees, and discharges into a condenser at 195 psia. The compressor runs at a speed of approximately 9,400 rpm. and requires 975 bhp. It will be direct connected to a 1,085 hp. steam turbine and will operate on 600 pound and 700 degree steam with 15 pound exhaust.

Other Carrier gas compressors in this same line range in capacity from 1,000 to 30,000 cfm. The smaller size units can be furnished with three, four or five impellers on one shaft. The larger units can be furnished with three of four impellers on one shaft. Both large and small units operate below the first critical speed. This line of compressors is designed to handle up to 8,500 hp. in a single casing.

They are adaptable to any temperature level from minus 150 degrees up to 100 or 150 degree inlet temperature. The pressure range is from extremely high vacuum up to inlet pressures of from 100 to 200 pounds per square inch.

OHIO SCHOOL SUES 281; STUDENTS CRY FRAUD

IN THE interest of the many trade schools in the country that are known to be doing a conscientious and thorough job of teaching refrigeration, we feel that such schools as described in the following article taken from The New York Post of July 28, 1947, should be exposed and driven out of business. Such business tactics as described here are a disgrace and outrage to the sense of fair business ethics practiced by the rest of the trade schools. This article, we hope, will serve as a warning to prospective students to investigate thoroughly the background and reliability of the school they plan on entering and to read and analyze carefully any contracts or agreements they may be ready to sign.

"An Ohio correspondence school has sued 281 New Yorkers in the last two and a half years, many of them veterans, and sought judgments totaling more than $60,000 an investigation by the New York Post showed recently.

"In every case where the student contested the suit, he charged that he was induced to sign the school's contract by fraud and misrepresentation. Yet in only one instance did a student win his case. By virtue of a trick clause in its contracts, the school was enabled to win every other action. In many instances the pleas of poverty by the students, some of them pathetically heartrending, were used by the school as evidence against the defendants.

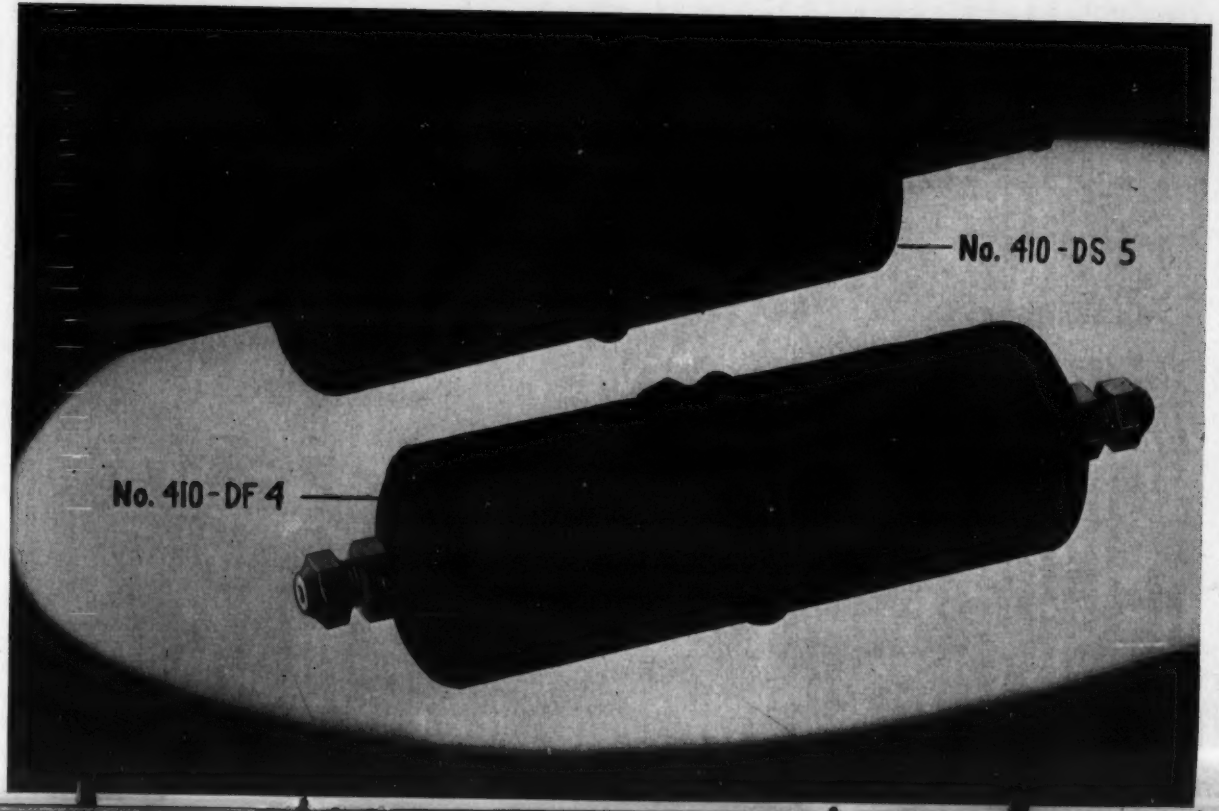
"The school has flourished despite the active opposition of the Better Business Bureau and despite a cease and desist order against misrepresentation from the Federal Trade Commission in 1941. The outfit is currently doing a gross "business" in excess of $3,000,000 a year.

"Since January 1, 1945, the school has sued 255 students in one court. Of these cases, one defendant successfully fought the claim, 91 are still pending and the school obtained judgments totaling $33,501.23 against the other 163. In the same period, 25 actions were filed in another court.

"Defendants were required to pay unpaid balances of their tuition, plus interest, plus court costs totaling $13.50. Those who let the school win by default were better off than those who fought, because the latter group had to pay, in addition to the judgment, the fees of their own counsel.

"Many defendants were young men who

(Continued on page 77)



Now Moisture and Dirt Come out Fast

Now...Moisture and Dirt Come out Fast in Your Larger Systems*, too!

Install new Large Capacity, Rechargeable

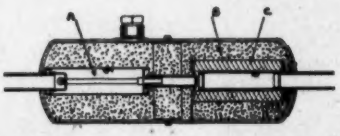
TRAP-DRI Drier • Filter • Strainer

• To you men who know how valuable the A-P TRAP-DRI can be on smaller systems up to 1 ton capacity — this announcement of a new larger-capacity TRAP-DRI will be welcome good news! It means you can give the "break" to both the larger systems, and those smaller systems which need a larger capacity drier for preliminary cleanout . . . Provide all these systems with the *extra protection* that means so much to improved system efficiency, avoidance of common troubles and service difficulties due to dirt, solder particles, scale, sludge and moisture.

• The new larger A-P TRAP-DRI starts cleaning up your system immediately, trapping all impurities and moisture that too often cause trouble. Offering *minimum pressure drop*, it provides a filter unit as effective as a 900 mesh strainer (removing materials as small as 5 microns in size) . . . *plus* a highly-efficient and adequate charge of Silica Gel.

Drying agent may be removed and replaced, or dried out and re-used.

• Installed on your larger refrigeration systems, this new larger capacity TRAP-DRI means improved operation, savings in service time, greater satisfaction and cost-savings for your customers. You'll find them at leading refrigeration parts jobbers — or write for latest bulletin.



Cross section of new 3-ton A-P TRAP-DRI showing: (A) Screen at inlet diffuses refrigerant into Silica Gel; (B) Silica Gel drying agent; (C) Honey comb filter element traps impurities as small as 5 microns, by depth filteration principle.

VERSATILITY IN INSTALLATION — The new TRAP-DRI is supplied either with ½" male flare (DF-4), or ⅜" sweat connection (DS-5). May be easily connected to ⅜", ½", ⅝", ¾" and even ⅞" tubing if desired. This ready versatility makes the TRAP-DRI adaptable to a wide variety of systems.

*Model 410 carries 53.7 cubic inches of Silica Gel. Nominal rating, 3 tons Freon

AUTOMATIC PRODUCTS COMPANY
2454 NORTH THIRTY-SECOND STREET • MILWAUKEE 10, WISCONSIN
Export Dept., 13 East 40th Street, New York 16, N. Y.

DEPENDABLE *Refrigerant Valves*

STOCKED AND SOLD BY GOOD REFRIGERATION JOBBERS EVERYWHERE . . . RECOMMENDED AND INSTALLED BY LEADING REFRIGERATION SERVICE ENGINEERS

QUESTIONS and ANSWERS

On Problems of Servicing and Installation of Refrigerating Equipment—Send Your Problems to the Question Box.

COMMENTS ON QUESTIONS

REFERENCE TO QUESTION 793—Due to top feed of lower coil you get capacity from top coil only, and lower coil acts as little more than a drier coil reducing effective area to that of the top coil.

Change the feed of the lower coil from top to bottom, attach expansion valve feeler bulb to second tube from top of lower coil, adjust expansion valve to frost entire lower coil to or slightly beyond feeler bulb. Try a switch setting of 8 and 25. If your methyl chloride system is fully charged and compressor in good condition you will find this hookup a great improvement. I have made this change a number of times in the past ten years with good results in every case.—G. I. *Richardson, Lake Bronson, Minn.*

REFERENCE TO QUESTION 798—Your trouble with the refrigerant system in the frozen food cabinet is due to the two Yoder plates that you are using. If you discussed the matter with any well informed engineer, I am sure he would advise you that a header type feed such as that used in this plate is very apt to short circuit the refrigerant and carry it through only a very small portion of the plate. This short circuited refrigerant affects the bulb of even the most excellent and most perfect expansion valve so as to reduce the feed and promote an even shorter circuiting.

You are very fortunate that the empty portion of this unfilled evaporator has not clogged with oil or wax as is indicated by the plate flooding and going to work when you warm the bulb. But be patient—it will fill up with oil, I am quite sure, and probably your first indication will be a burned out bearing on the compressor. When this occurs, you may suspect that this is giving you some difficulty.

REFERENCE TO QUESTION 798—As this question states the last plate in circuit fails to frost, I believe this system has plates connected in series which is the trouble primarily. If you will check with the manufacturers of Hubbell Yoder plates you will find that they do not recommend series connections of plates but parallel feeding in at bottom and out at top for the application mentioned.—*John J. Zirkelbach.*

REFERENCE TO QUESTION 799—This serviceman did not say, but I drew a good price for servicing a Norge which had the same symptoms, after two other servicemen with much more experience failed to do it any good.

The Norge compressor can only run in an anti-clock direction to pump. Ask him to check the rotation. I will bet that is his trouble.—*William H. Stallings.*

SODA FOUNTAIN TROUBLE

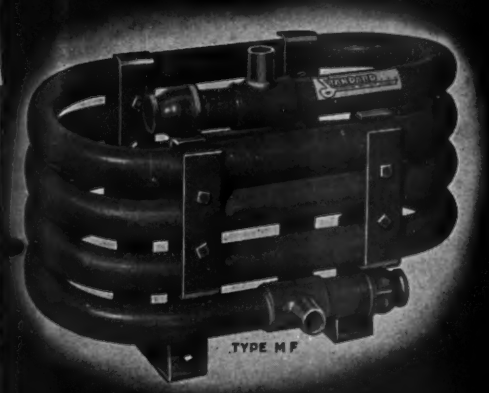
QUESTION 802: We have been having considerable trouble with a soda fountain. There is no name plate on this fountain, but I understand it is a Valerius.

It is cooled by a Frigidaire low-side float coil which is situated between two of the compartments. The action of this fountain is very peculiar in that I can get this coil down to operate on 20 inches of vacuum yet cannot get the compartments below 2°.

The cabinet is full of brine. There are two valves on the right that are supposed to control the temperature in three compartments, but I cannot get them cold enough. It appears as though I am getting more than enough refrigeration at the coil but do not get any transferred to the brine and to the compartments.

ANSWER: From the description you have given me on the Valerius soda fountain, I am inclined to believe the trouble is due to a weak brine solution. This is a situation that will very often fool the most experienced men in soda fountain work because it is so easily overlooked, and even if the top of the cabinet is taken off so you can see down into the brine it is often overlooked.

Due to its continuous use, the calcium



STANDARD

ECONOMICAL— The multiple tube design gives rapid heat transfer resulting in low water consumption and high condensing unit capacity. Refrigerant and water travel is at a minimum, thereby reducing pressure drop.

SIMPLE— Water flows through a cluster of 1/2" copper tubes in the Multi-flow condenser. Mounting is designed for easy installation.

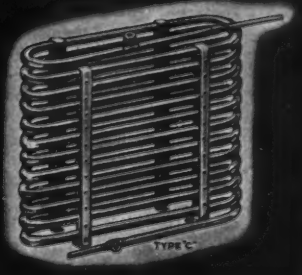
CLEANABLE— Continuous sweeping return bends permit easy cleaning. Simply disconnect the water inlet of the Multi-flow condenser. Then use a plumber's auger turned by hand or electric drill.

NOW AVAILABLE IN SIZES RANGING FROM 1 1/2 to 25 H.P.

TYPE C SERIES

Standard's well-known, all-copper counterflow condenser meets the requirements for high capacity on 1/2 to 3 H.P. units. Compact, light, and fabricated on short radius bends for convenience in mounting and replacement.

Write or Ask Your Wholesaler for Complete Specifications



chloride will be gradually dissipated until the solution becomes so weak that the water is separated from the brine and frozen in a layer around the coil. In doing this, an insulation blanket is set up around the coil, which prevents the conductance of heat from the brine to the coil.

The condition has probably been developing over a period of time but it has been possible to secure sufficient temperature by lowering the pressure control settings so that the machine operates on a lower temperature; however, the condition eventually gets to the point where it is no longer possible to secure the proper temperature.

To remedy the situation it will probably be necessary to allow the entire cabinet to warm up to the point where the ice will melt, pump out the old brine, and either add sufficient calcium chloride to bring it up to its proper strength or to replace the entire solution with new solution.

MILLS HARDENING CABINET

Question 803: Can you help me out on a Mills Ice Cream Maker and Hardening Cabinet, 1935—Model 26—Ser. 527?

Customer's complaint: Water running out on the floor from cabinet. Looking under the cabinet I found drops of water all over the bottom and on the end next to compressor compartment. Compressor is in the basement. My check-up indicated condensation. There are about two inches of space between the bottom of the compressor and the floor. Would it help to fill this space with rock wool insulation?

Does this job contain brine?

What is the proper or correct temperature for the hardening cabinet?

Would cutting down the expansion valve help?

Answer: The holdover solution in the Mills hardening cabinet is contained in the three ice slabs of the cabinet, one in each side of the cabinet and one in the center of the cabinet. This holdover solution is a low grade paraffin oil, such as Standard Flushing, Dionne, or any other type of oil.

The recommended temperature for the Mills hardener is from minus 18 degrees to minus 24 degrees. This, of course, depends on the butterfat content of the mix being used—the higher the butter-fat content in the mix, the lower the temperature necessary.

With regard to condensation on the bottom of the hardening cabinet, your letter states that this condensation forms on the bottom of the hardening cabinet at the compressor's compartment end. This leads us to believe that the Kapok insulation at this end of the hardening cabinet has broken down. The tubing connecting the three ice slabs is at this end of the cabinet, and undoubtedly the moisture from the defrosting of these tubes has soaked the Kapok and is dripping through the insulation on the bottom of the cabinet.

This condition should be corrected as soon as possible, or the whole bottom of the hardening cabinet will become broken down and will necessitate a complete re-insulation job on this particular part of the cabinet.

The only other thing we can figure that would cause this condensation is that your customer defrosts and washes out the cabinet and in doing so uses too much water and floods the bottom of the cabinet to a point where the water reaches the top of the bottom pan and overflows into the bottom insulation slab. This, however, is problematical, as these hardening cabinets are defrosted so seldom that it would take considerable length of time before a condition like this would make itself known.

We would suggest that the Kapok in the freezer and hardening cabinet be changed; this is a very simple operation and will probably correct the condition. If you follow the following suggestions you should not have any trouble:

Remove the two screws from the top of the inside enclosures, bend these forward into the hardening cabinet, and remove all old Kapok. Repack very tightly again with fresh Kapok, and then close your plates back into position and replace screws.

The recommended control setting on this particular job is in at zero pound pressure and out at 18 inches of vacuum. The suction line of the hardening cabinet should have a permanent frost-back of approximately 8 inches on the outside of the cabinet.

CLEANING SYSTEMS

Question 804: Would it be practical and favorable to do this: If I had a refrigeration outfit and it contained carbon and sludge and I wished to clean it out as much as possible, but was not able to send it to a shop to have a dehydrating job done, would this system be advisable?

I would open up the refrigerant system and blow out all of the old gas and oil with the pressure that was in the system, then I would connect a drum that was heated slightly to increase the pressure and connect

it on one end of the system and blow the new refrigerant in the system and out of the other end to clean it out. After doing this, the pipes would be shut off as quickly as possible so that no more air would enter the system. Then the system would be recharged and again placed in operation. Would this be advisable or not, under the circumstances where I was unable to send it out?

Is there any known method to remove sludge and carbon from a system other than a cleaning out and dehydrating job? Is there anything like a dehydrator tube that would perform this job?

In introducing Ice-X to a system, would it be all right to pump it in with a small pump, while the set was in operation, through the gauge plug in the discharge valve?

A Crosley Type FDA and CC seem to run most of the time; the evaporator is covered with ice except a very small portion right on top of it; ice cubes freeze all right; the compressor seems to get real hot and uncomfortable to the hand when left on a short time; the condenser is cool; the suction pipe is slightly warm and the motor gets quite hot from long-running periods. What would be your view as to the trouble? When the control is turned on defrost, the compressor keeps on running just the same.

ANSWER: Your method of cleaning refrigerating systems is probably all right as far as it goes; however, I don't think you will succeed in removing any more than the loose particles of dirt from the system by merely blowing it out. The mixtures of oil and carbon, or the sludge which may be clinging to the walls of the tubing would probably remain without any effect from the blowing out process.

Method of Cleaning

Carbon tetrachloride is probably the best cleaner you can use on such jobs. It is a good solvent and it dissolves oil and at the same time will take up a certain amount of moisture from the system, or if there is no moisture present there is no danger of anything being added because carbon tetrachloride is thoroughly dry in itself.

If the system to be cleaned employs a continuous tube type of evaporator it is only necessary to remove the expansion valve, or float valve, as the case may be, connect the liquid line directly into the evaporator, then with both lines disconnected at the compressor, force carbon tetrachloride through the tubing and evaporator and catching it again in a container at the outlet.

The best type of equipment to do this with is a gallon container which should be strong enough to stand one hundred pounds or more pressure and which is provided with an outlet at the top and bottom. The bottom outlet should be connected to the tubing—preferably the liquid line—and the drum of carbon dioxide or other gas should be connected to the top outlet.

When the container is filled with carbon tetrachloride admit the pressure from the drum of gas and force the carbon tetrachloride through the system. This may be repeated several times until the carbon tetrachloride is comparatively clean.

Cleaning Flooded Type

Evaporators of the low side float type or of the flooded header type would have to be removed and washed with carbon tetrachloride separately. All other parts of the system such as the condenser, receiver and compressor, can be removed and washed separately. After washing, all parts should be thoroughly blown out under pressure to remove the excess carbon tetrachloride. Then, after assembly, a vacuum of at least 28 inches should be held on the entire system and heat applied with a blow torch or other means at hand to insure the removal of the carbon tetrachloride.

Ice-X may be introduced to a system in any manner found convenient providing it is inserted in the high side of the system.

On the Crosley type FDA and CC refrigerator I am inclined to believe your trouble is due to a shortage of refrigerant. This is a capillary tube type of system and refrigerant charge is quite critical. I would suggest that you add refrigerant slowly until frost appears for a distance of several inches outside of the evaporator. Then purge a small amount off until the frost settles to a point within two or three inches from the evaporator.

ALCO THERMO-LIMIT
THE *all-purpose* VALVE

It's the only control with all these advantages "in one package":

- **LIQUID CHARGED—INSTALL IN ANY POSITION, ANY TEMPERATURE**
- **SEPARATE SUPERHEAT CONTROL**
- **SEPARATE PRESSURE LIMITING**

and when necessary:
Quick Capacity Change • Easy-to-change Pressure Limit

Set it and forget it!

Why carry several valves when there is a THERMO-LIMIT valve for ANY job? The Thermo-Limit will save you trouble, time and money.

ALCO VALVE CO.

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Designers and Manufacturers of Thermostatic Expansion Valves; Evaporator Pressure Regulators; Solenoid Valves; Float Valves; Float Switches.

NEWS and ACTIVITIES

Announcements of the activities and educational work of the International Society and Local Chapters appear in this department.

COMING CONVENTIONS

Alabama Association
Place: Admiral Semmes Hotel
City: Mobile, Alabama
Date: October 17, 18
Chairman: T. O. Cooper, Harris Supply Co., Mobile, Ala.

National Locker Convention
Place: Municipal Auditorium
City: Kansas City, Mo.
Date: September 25, 26
Director: R. R. Farquar, 656 Insurance Bldg., Omaha, Neb.

Illinois State Meeting
Place: Baker Hotel
City: St. Charles, Ill.
Date: November 1, 2
Secretary: R. E. Saunders, 730 Towanda Ave., Bloomington, Ill.

New England States Association
Place: Bond Hotel
City: Hartford, Conn.
Date: November 9
Secretary: Lee J. Wallace, 29 Cave Street., New Haven, Conn.

RSES Annual Convention
Place: Hollenden Hotel
City: Cleveland, Ohio
Date: Jan. 21, 22, 23, 24, 1948
Secretary: H. T. McDermott, 433 N. Waller Ave., Chicago 44, Ill.

R.E.M.A.—All-Industry Exposition
Place: Cleveland Public Auditorium
City: Cleveland, Ohio
Date: January 26-29, incl., 1948
Secretary: R. Kennedy Hanson, 1107 Clark Bldg., Pittsburgh, Pennsylvania

Interprovincial Association
Place: King Edward Hotel
City: Toronto, Ont.
Date: March, 1948. Dates to be announced later.
Secretary: E. G. McCracken, 215 Laird Drive, Leaside, Ontario.

RSES INTERNATIONAL COMMITTEES

PRESIDENT W. W. Allison recently announced additional committee appointments for the International Society. Chairman of the new committees, together with those previously announced, include:

PUBLICITY—Willis Stafford, 20 N. Wacker Drive, Chicago 6, Illinois
COST RECORDS—W. C. Irving, 1425 Lincoln Blvd., Santa Monica, California
STANDARDS—Carl Olin, 4210 West 62nd Street, Los Angeles, California
SAFETY—George J. Schuld, 4596 Warner Road, Cleveland, Ohio
NOMENCLATURE—Earl Yockey, 209 Hinman Avenue, Columbus 7, Ohio
CODE—Chas. Harris, 2044 Massachusetts Avenue, Cambridge 40, Mass.
EDUCATIONAL—Paul B. Reed, 500 W. Oklahoma Ave., Milwaukee 7, Wisconsin
TRADES RELATIONS—A. L. Robertson, 771 University Ave., Madison, Wis.
CONSTITUTION & BY-LAWS—C. J. Doyle, 4339 California St., Omaha 3, Neb.
EMPLOYMENT—H. T. McDermott, 433 N. Waller Avenue, Chicago 44, Illinois
EDUCATIONAL FUND—G. E. Graff, 601 W. 5th Avenue, Columbus, Ohio

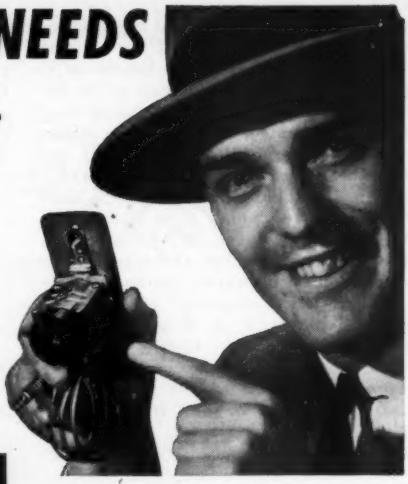
GREEN BAY, WISCONSIN, ORGANIZES

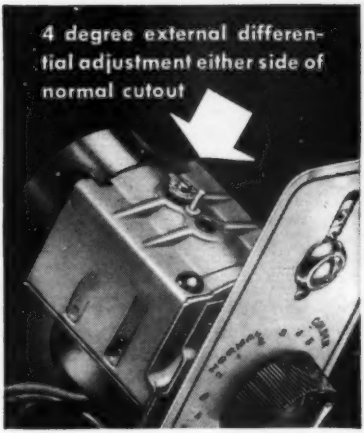
ON MAY 28th a group of refrigeration men met in the city of Green Bay, Wis., for the purpose of considering the formation of a chapter of the Refrigeration Service Engineers Society. Although a heavy snowstorm during the evening prevented many from attending, there were 35 who found it of sufficient interest to brave the storm. Ervin E. Gass, manager of the Gustave A. Larson Company store at Green Bay, took a very active part in promoting this meeting.

FILLING ALL NEEDS

The Cutler-Hammer Line of REFRIGERATION REPLACEMENT CONTROL

This One Universal unit alone covers 60% of all needs.





Bul. 9521N9

Adjustable Mounting Brackets

Maximum Mounting Centers..... 4-3/16
Minimum Mounting Centers..... 2-3/16

Adjustable Cutout Feature—Differential can be increased 4 degrees by turning indicator in "Hi" direction and decreased 4 degrees by turning in "Lo" direction.

Adjustable Range—Turning screw clockwise lowers settings and counter-clockwise raises settings.

Operating knob can be adjusted to meet various evaporator scale settings. New knob is ideal for varying shield thicknesses. Makes *this* control adaptable to wider range of single dial replacement jobs where overload is not required in unit.

The Cutler-Hammer line of Refrigeration Replacement Control will meet all the refrigeration serviceman's requirements. One Cutler-Hammer Control Unit alone . . . the *Universal* Replacement unit . . . will handle 60% of his needs. And where exact replacement control is needed, that item also will be found in the C-H Exact Replacement Control line . . . individually packed, clearly labelled, complete with dial plate, mounting screws, trim washers and full instructions for mounting and adjustment.

Behind this line are 50 years of control specialization and thorough knowledge of merchandising requirements. Thus, the line is recommended by outstanding refrigeration wholesalers from coast to coast and alert service organizations everywhere use it to reduce investment in stock, to insure regular and rapid turnover, faster completion of the job, and greater all-round satisfaction. CUTLER-HAMMER, Inc., 1363 St. Paul Ave., Milwaukee 1, Wisconsin.

CUTLER·HAMMER
MOTOR·CONTROL
C-H

DOMESTIC, SEMI-COMMERCIAL AND COMMERCIAL CONTROL

Past President Clarence Buschkopf of Beaver Dam, Wis., was present to aid in the formation. Ervin Gass called the meeting to order, then called upon Mr. Buschkopf to explain the purposes and objects of the Society. Various other visitors including Fred Hansen, president of the Fox River Valley Chapter, Erest Mueller, director of the Wisconsin State Association, and Ardon Abrahan of Oshkosh, manager of the Gustave A. Larson Company store in that city, gave appropriate talks. A resolution was passed to the effect that a chapter of the Society be formed, bearing the name Green Bay Chapter. Temporary officers were elected as follows: J. A. Mekel, *President;* Victor Prey, *Secretary;* Charles E. Chase, *Treasurer.*

Approximately 20 of the men present signed applications for membership and the application for a charter. It was decided, however, that the application for charter should be held open until some time in September, permitting others to add their signatures. It was expected that arrangements for the presentation of the charter will be made some time in October or November.

ILLINOIS STATE 10TH ANNUAL CONVENTION PROGRAM

PLANS for the Illinois State Association 10th annual meeting to be held in St. Charles, Illinois, November 1 and 2, are all set. The two-day meeting to be held at the Baker Hotel promises to be one of the best the Association has yet produced. It includes two full sessions of educational talks, two general business sessions, the 11th annual Herman Goldberg party, a dance and show. Early reservations for hotel accommodations are urged by the committee to avoid last minute disappointments. Reservations should be made direct with the Baker Hotel, St. Charles, Ill.

It is expected the crowd will begin gathering Friday evening, October 31, and there will be an informal get-together with a discussion program conducted by Frank Frazee of Westerlin-Campbell Co. Saturday morning the general call to order will be made by President John Sackey in the Main Auditorium of the Community House, and the balance of the morning will be taken up with reports of the officers, appointment of Nominating, Auditing and Resolutions Committee.

Saturday afternoon there will be a brief business session and the first speaker of the educational program will be introduced by Harold Anderson, who is the State Educational Committee Chairman. The speaker, Ray Gregory of Clark Bridgeman Company, will speak on the subject "Blower Coil Applications." The second speaker of the afternoon will be Ed Asproth, Dunwoody Institute, Minneapolis, on the subject "Freon-12 and Freon-22 Applications." As a final attraction on the Saturday session, there will be an Exhibition of Shop Repairs with Felix Wierman of Chicago Seal Company, acting as Moderator.

At 6:00 p.m. Saturday evening there will be a cocktail party and at 6:30 p.m. the annual banquet will get under way in the Auditorium. There will be music by the Barber Shoppers, the installation of new officers, and a skit, "How Not to Run a Meeting," sponsored by the State Association's Training Committee. At 9:00 p.m. the Herman Goldberg 11th annual party, including a dance and show, will occupy the balance of the evening.

The Sunday morning educational session will include a talk by R. L. Hendrickson, Nickerson & Collins Company, "Promotion for Profit," and balance of the morning will be taken up with unfinished business, consideration of the next convention city, and other business matters.

INDIANAPOLIS CHAPTER PICNIC

THE grand event of the year, an all-day picnic, was held at Walnut Grove, near Acton, Ind., sponsored by the jobbers and wholesalers of Indianapolis. The affair turned out to be a great success and a good time was had by all that attended. More than 200 people, consisting of members, their families and friends, were treated to a royal time with free soft drinks, coffee and ice cream. Over 50 gifts donated by the various stores serviced by the members, were given away during the day.

Mr. Hartzog was chief coffee maker, Mr. Jennings and Mr. Hoffmeyer served the ice cream and soft drinks, Mr. Wulf was master of ceremonies at the "mike," and Mr. Mohr officiated at the sound system playing music for the crowd. All the other members donated freely of their time in getting the equipment and other necessary items to the picnic site, arranging the games and other duties that go to make the picnic a success.

J. M. MANLEY, Pres.
90 Oklahoma Street

H. M. BEDSOLE, Sec.
511 Locust Street

WILBER E. PRICE, Treas.
102 Pershing Street

MONTGOMERY REFRIGERATION SERVICE and Education

CHAPTER ENGINEERS SOCIETY Organization

Montgomery, Alabama

The Refrigeration Service Engineers Society of Montgomery is composed of eighty per cent of the qualified refrigeration mechanics of this city. In order that they use the R. S. E. S. symbol, it is necessary for them to meet rigid qualifications and to have had a minimum of actual experience in this work, sufficient to enable them to do refrigeration work in accordance with the requirements of R. S. E. S.

Our members have been heavily overworked the past five years, and are still working long hours in order to meet the demands made of them by the public.

Many of you are requiring their services to maintain obsolete or badly worn refrigeration equipment which you have been unable to replace because of an extreme shortage of this kind of equipment. These servicemen come to you all hours of the day and night to render you their services whenever possible. We fell proud of the service our members have given in the maintenance of this equipment.

Our members are being confronted with the problem of returning to many of their jobs to collect for their services. You must realize that while the serviceman is on a collection mission he could be doing another service job.

We would like to urge you to pay your serviceman upon completion of his work. In this way it will not be necessary for him to return in order to collect for his services.

Many of our members have accumulated a number of unpaid service charges and are being required to return again and again to collect for their services.

It is being proposed that our organization serve as a clearinghouse for such accounts, and that they be advised of the paying status of all customers, so that they may not have the same experience as some other member.

This letter is being written you, a customer of our member, so that you may know the steps that may be taken if the account should become delinquent. Our members must have your cooperation and their request for cash payment is only fair and reasonable.

This organization will at any time welcome criticism and suggestions and will appreciate a letter from you if you should ever feel that the services rendered by members is not in keeping with fair practices.

Sincerely yours,

J. M. MANLEY

The Montgomery Chapter in Montgomery, Alabama, provides its members with copies of the above letter which they can mail to their customers. The letter bears the signature of the chapter president on chapter stationery and does not show the name of the individual companies using it.

LIMA SEES FIRST SHOWING OF NEW ELECTRIC EVACUATOR

MYRON L. MOWREY, Educational Director of the Lima Chapter R.S.E.S., announces that Mr. Emmett C. Williams, President of the Airserco Manufacturing Company, Inc., Pittsburgh, Pa., discussed and demonstrated Airserco's new Valve Analyzer System and other hermetic analyzer equipment.

At this meeting Mr. Williams reports the first public showing of Airserco's new, portable, electric Evacuator.

This new product, developed by Airserco Manufacturing Company, permits the service engineer to evacuate hermetic units, change oil in compressors, and performs numerous other short-cuts for the service engineer.

The meeting was held at the Allied Supply Company Display Room and was also attended by Mr. Lewis D. Morris of the Frigidaire Sales Corporation, Dayton, Ohio.

S S S

Chapter Notes

● ARROWHEAD CHAPTER, *Riverside, Calif., July 14*—W. W. Allison, International President, was one of the honored guests of the evening and as a part of the activities of the evening he was asked to install the officers for the coming year. Mr. Allison did so with a few remarks about the responsibilities of the officers, and those installed were the following: Herb Kaeding, *President;* Ed Warner, *1st Vice-President;* C. Edwards, *2nd Vice-President;* Phil Montgomery, *Secretary;* E. L. Gilmore, *Treasurer;* D. W. Crawford, *Sergeant-at-Arms;* Carlton Ricker, *Educational Director.* Board of Directors—F. Frazier, F. W. McCulley, W. Bird, D. M. DeWeese and V. Kerr.

On the educational program, Director Carlton Ricker introduced Mr. Goodson, sales manager of the Ultra Violet Products, Inc., who in turn introduced T. S. Warren, president of the same company. Mr. Warren then gave an interesting talk and demonstration of the effects of ultra violet rays on mineral specimens, and then showed its application to a walk-in refrigerator for the control of bacteria. An intermission was then declared while the gathering enjoyed the refreshments furnished by Van's Supply of Long Beach, which included coffee, cake, ice cream and doughnuts.

A beautiful gavel made of plastic in the form of an arrowhead, and the charter framed with an arrowhead at the top, was presented to the chapter by the retiring president, Ray Zimmer. Needless to say, a large hand of thanks was extended to Mr. Zimmer for this gesture.

● CENTRAL ARIZONA CHAPTER, *Phoenix, Ariz., July 8*—The meeting was held at the American Legion hall with President Tally presiding. Reports of officers followed, winding up the year's business, and there was considerable discussion on the picnic held at South Mountain Park which was well attended and enjoyed by the membership in general.

The annual election of officers resulted in the following: C. M. Tally, *President;* James L. Rardin, *1st Vice-President;* Sam Bender, *2nd Vice-President;* Al Mathiason, *Secretary:* Fred D. Perry, *Treasurer;* Joe W. Clark, *Sergeant-at-Arms.* Directors—M. B. Barlow, Carl J. Karlson, Orrin Hodges, Earl B. Marlowe, Jr., V. M. Shaw, Kenneth Marshall, Vorls Page.

● CENTRAL CONNECTICUT CHAPTER, *Hartford, Conn., July*—There were 58 members and guests in attendance at this meeting. The guest speaker of the evening was Frank Flood of Connecticut State Tax Office, who

To the left is a general view of the Calgary chapter meeting held June 20th at the Pallister Hotel, Calgary, Canada, where a large attendance enjoyed a demonstration of a glass evaporator by John Schlemmer of General Controls, Glendale, Calif. W. H. Dowling, president of the chapter, appears at the right with the chapter emblem.

was introduced by Mr. Andreen. Mr. Flood talked on the proper procedure to follow in reporting tax to be collected through the 3% Connecticut state sales tax. It was a very comprehensive and constructive talk enjoyed by the membership. President Felix conducted a short business meeting including a discussion of the forthcoming picnic.

● CHICAGO CHAPTER, *Chicago, Ill., August 12*—As usual, M. Brunderman conducted the educational session and introduced Mr. McGee of Kelvinator, who discussed oil and refrigerants in the hermetic unit and how Kelvinator pioneered methods in charging hermetics. Mr. McGee answered many questions on the subject of hermetics and all in all, was very much enjoyed by the membership. Mr. Hathaway of Tenney Engineering, Inc., gave an interesting talk on their valve and its application. He also provided the membership with literature on Tenney products. The door prize for the evening—$5.00—was won by Ernest Fait.

● COLONELS CHAPTER, *Louisville, Ky., July 10*—Sixty-nine members and visitors attended this meeting to hear R. N. Meyers of Alco Valve Co., who was guest speaker for the evening. He spoke on products manufactured by Alco Valve Company, and provided two valves and one extension cord as door prizes. V. J. Lumbardo received first prize—a valve, Chas. Kindall received second prize—the other valve, and the extension cord for the third prize went to John Harris. In addition to describing the valves manufactured by Alco, Mr. Meyers gave a demonstration on the Alco glass evaporator, followed by the showing of slide films.

● DAYTON CHAPTER, *Dayton, Ohio, July 10*—The meeting was held at the Allied Supply Co. D. J. Mourry and Charles Kinsworthy were voted in as new members. The picnic committee reported all arrangements complete. Mr. Denny introduced Mr. Daunels of the Sporlan Valve Company, who conducted a discussion on the design, application and operation of expansion valves.

At the August 14th meeting, held in the clubroom of the W. H. Kiefaber Co., Mr. Roffman of the Hedeman Products Co., distributors of Koroseal beer dispensing equipment, talked on the subject of proper handling of beer and servicing beer equipment.

● DIRIGO CHAPTER, *Auburn, Maine, July 10*—The meeting was preceded by a buffet lunch at 7:30 p.m. and the meeting was called to order at 8:30 p.m. During the business discussions it was decided to hold the next meeting at Rockland, and a committee including Carroll Merrill, Clayton E. Canning, Whitney W. Rawson and Ernest B. Haskell was appointed to make arrangements. On the educational program, E. Wyrough of Tenney Engineering, Inc., demonstrated the Tenney TS-1 valve with a length of plastic tubing and a small compressor.

● ELM CITY CHAPTER, *New Haven, Conn., Aug. 1*—Much business and hot weather left little time for more than routine procedure. Treasurer Woods reported fifty paid up members as of August 1st; the Outing Committee reported that plans were all set for a gala time; and the Auditing Committee reported the books in balance. The Secretary read the report on minutes of NESA summer meeting at Southbridge, Mass., on July 8, in absence of Lee Wallace, the association secretary. New members accepted—Robert Swanson, Ernest Priebe and Charles Caleffy. Bernard Paktor was accepted on transfer from Fairfield Chapter. George Ives was appointed corresponding secretary.

On August 17th, sixty-six members gathered at Restland Farms, Northford, Conn., for the 4th annual outing. An epic dinner of broiled chicken, sweet corn and all the fixin's accompanying was the highlight. Two baseball games, barnyard golf and poker kept the boys out of mischief. The second baseball game was official with the "High-sides" defeating the "Low-sides" 17 to 16 and winning the cash.

● FLORIDA WEST COAST CHAPTER, *Tampa, Fla., July 10*—Applications were received from R. L. Seiden, Carl J. Dean and Vernon Hunsucker. The annual election of officers was held with the following results: H. B. Adams, *President;* Sam Graziano, *1st Vice-President;* George Mitchell, *2nd Vice-President;* W. A. Bingham, Jr., *Secretary;* H. M. Carryl, *Treasurer;* George Benke, *Sergeant-at-Arms;* W. A. Bingham, Sr., *Educational Secretary.* Board of Directors—A. R. Pool, Joe Stephens and J. R. Berryman. On the educational program, a film on the adjusting and repairing of the expansion valve was shown.

● FURNITURE CITY CHAPTER, *Grand Rapids, Mich., July 1*—A dinner at the Oakwood Cafe preceded the meeting held in the banquet room immediately afterwards. The Traffic Committee reported on their work with the Traffic Bureau on the matter of parking in the downtown area. The September dinner date was changed to the second Tuesday to avoid confliction with the Labor Day weekend. Mr. Domke of Mueller Brass Co. gave an educational discussion on driers, valves, fittings and solder joints.

● GREENVILLE, S. C. CHAPTER, *Greenville, S. C., Aug. 13*—The Membership Committee submitted two new applications for membership—one of which, Ralph Sorrel's, was accepted. Bill Durham was elected acting 2nd Vice-President to replace Bill Williams, who has left Greenville. Considerable discussion was held on the merits of phone ads which turned to a discussion on the importance of having a private telephone line for servicemen. V. W. Swan volunteered to take up this matter with the Telephone Company and report at the next meeting. L. C. Black, Bill Durham and A. L. Lee were appointed on a ways and means committee.

● HEAD OF THE LAKES CHAPTER, *Duluth, Minn., July 7*—The speaker of the evening was J. H. Spence of Hussmann Refrigeration, Inc. He gave a very interesting lecture with the use of colored motion pictures, on the Hussmann vegetable display case. The evening was completed with a case of cold refreshments and a few stories by Mr. Spence.

● IND'ANAPOLIS CHAPTER, *Indianapolis, Ind., Aug. 12*—The meeting was called to

order by President Hartzog and a letter from the Chicago Office concerning identification plates for servicemen's cars was read and discussed and a request made for more definite data as to when the plates would be available for us. A vote of thanks was given by E. W. Wulf, thanking the officers for their cooperation concerning the picnic. Mr. Smiley of Nash-Kelvinator requested an opportunity to present their new water cooler at an open meeting to be held later at the Athenaeum.

● JOPLIN CHAPTER, *Joplin, Mo., Aug. 13*—Film No. 433 on removal and installation of cooling units was shown with slides. There were about 35 members in attendance, and R. L. Williams of Temprite Products Co. was introduced as a guest. The drawing for a $5.00 gift coupon was won by E. R. Snyder. There were three new members admitted to the chapter and a discussion held regarding appropriation of money to send a delegate to the National Convention to be held in Cleveland next January. Refreshments were served following the meeting.

● LIMA CHAPTER, *Lima, Ohio, July 17*—Educational Director Myron Mowery presented Mr. Williams of the Aircraft Service Company, who gave an interesting talk on testing and analyzing equipment. The guest of the evening, Louis Morris of the Frigidaire Corp., came in for a good many questions on various service problems and answered them very thoroughly. Refreshments were served following the meeting.

● MIAMI CHAPTER, *Miami, Fla., July 10*—In honor of installation night for the new officers the meeting was preceded by a dinner at the San Regis Restaurant. Members and their wives enjoyed the dinner, after which the meeting was called to order by President J. D. Nall. O. W. Bron, Secretary-Treasurer, gave a financial report for the year which showed the chapter to be in good financial condition. Herbert Weinstein, Sol Silverstein, John Refeen, Jack D. Powell, Paul M. Connally and William H. Carter were received into the chapter.

Installation of new officers was conducted by President Nall. Dick Turpin was charged verbally and in writing as to his duties to the chapter as its president, Mr. Ritchie as 1st Vice-President, Mr. Leach as 2nd Vice-President, Mr. Comfort as Secretary-Treasurer, Mr. Kelly as Sergeant-at-Arms and Mr. Runyon as Chairman of the Educational Committee. Mr. Nall relinquished the president's chair to Mr. Turpin whose acceptance speech was heartily applauded by members and guests. All the newly elected officers in short talks urged the members to cooperate in increasing attendance at the regular meetings of the chapter.

● MILE HIGH CHAPTER, *Denver, Colo., July 20*—This was the date of the chapter's annual picnic held at Lafonda Park in Elitches' Gardens. The picnic was planned and conducted by R. C. Kimmel, assisted by the officers of the chapter. One hundred five people attended. Immediately after lunch the drawing was held. Many fine presents, donated by members of the chapter and firms connected with the refrigeration industry, were given away. Some of the gifts were a radio, electric iron, toaster; nylons, rachet sets, dial thermometer, frozen food kit, candy, hermetic kit and light bulbs. Everyone present was eligible for the drawing. The children's games and races were next on the program with many fine prizes for the winners. The women's contests were next with cash prizes. Last but not least came the horseshoe tournament. E. L. Martin and Kenneth Morris won the championship. Pop, ice cream and beer were served free throughout the afternoon.

● MONTGOMERY CHAPTER, *Montgomery, Ala., July 20*—The 3rd annual picnic was held at Oak Park in Montgomery with a Bar-B-Que for the members and their families. One hundred and twenty-five members and guests were in attendance, with guests coming from Birmingham and Mobile Chapters. The State Association officers held their 3rd quarterly meeting during the day and President J. M. Manley announced his confidence of the best convention ever held in Alabama, breaking all attendance records, some time in October.

Members and guests of the Sunshine City Chapter who enjoyed a steak dinner July 10, before meeting to hear a discussion on codes by Marshall Johnson of the City Building Department.

NEW HAND-SIZE APPLIANCE TESTER

. . . . for volts, amperes, watts

Here is the first appliance tester ever made that gives you volt, ampere, and wattage readings all from one small, compact instrument.

Model 390 slips easily into a large pocket, weighs only a pound and a half, is designed for hard, continuous service.

The range of uses for this volt-amp-wattmeter is almost unlimited in checking line voltage, current drain and power consumption, the three simple tests which will diagnose most cases of electrical trouble. In fact, practically any household electrical appliance that has a motor or a heating element, can be tested by the 390, as well as certain industrial installations.

You merely plug Model 390 and appliance to be tested into the Break-In plug furnished—voltage will read. To read watts or amperes, simply press one of the two buttons at bottom of the panel.

Aside from its unique features, Model 390 has no equal among appliance testers in quality alone. The famous Simpson quality makes investment in the Model 390 an investment that will return a rich yield in satisfactory service through the years.

USE MODEL 390 FOR TESTING

Refrigerators	Motors
Deep Freezers	Electric Heaters
Washing Machines	Radio Sets
Irons	Lamps
Toasters	Vacuum Cleaners

and all similar appliances.

Simpson Model 390
Volt-Amp-Wattmeter

Ranges—A.C. Current, 60 cyles.
Volts: 0-150, 0-300.
Amperes: 0-3, 0-15.
Watts: 0-300, 0-600, 0-1500, 0-3000.
Size: 3"x5⅞"x2½". Weight 1½ lbs.
Shipping weight 3 lbs.

Price, with Break-In plug and leads	$39.50
Leatherette Carrying Case, with leads compartment	4.00
Genuine Leather Carrying Case, with leads compartment	8.00

Simpson

INSTRUMENTS THAT STAY ACCURATE

SIMPSON ELECTRIC COMPANY
5200-5218 W. Kinzie St., Chicago 44, Ill.
In Canada, Bach-Simpson Ltd., London, Ont.

● OIL CAPITAL CHAPTER, *Tulsa, Okla., July 16*—During the business session of the evening R. W. Palmer reported plans complete for the annual picnic the latter part of September. Mr. Epps broached the subject of zoning in Tulsa, pointing out that it is being done successfully in other cities. After discussion it was the general opinion that such a move would not be advisable at the present time. A Question Box was suggested as a means of group discussion of any matters. K. G. Wight deplored the practice of some servicemen knocking or criticizing other men who had preceded them on various jobs. This practice he considered poor policy and detrimental to the organization as a whole.

● ST. LOUIS CHAPTER, *St. Louis, Mo., July 29*—The attendance prizes for the evening were won by Earl Fix, G. Siemer and A. Calcaterra. Joe Pedrotti, Service Manager, Metropolitan Ice Cream Co., gave an interesting talk on the educational program about the facilities of their ice cream plant. He extended an invitation to the members to visit this plant at any time. President Vizgird gave a brief outline of the ethics and benefits of membership in the Society. After business for the evening was completed the meeting adjourned and refreshments were served, including ice cream provided by the Metropolitan Ice Cream Co.

● SAN DIEGO CHAPTER, *San Diego, Calif., July 17*—The chapter reports that the membership drive is on the upgrade. Ralph French of the Educational Committee is presenting the southwest corner with some very novel and interesting entertainment. His choice of speakers is tops and the chapter feels fortunate in having the right people in the right offices.

● SEATTLE CHAPTER, *Seattle, Wash., Aug. 5*—The guest speaker of the evening was William Nason of General Controls Company, who presented a talk illustrated with a glass evaporator on the operation of thermostatic expansion valves. Mr. Nason utilized colored slides as part of his illustration and used Visoleak in the refrigerant which made the flow through the glass evaporator more easily seen and provided a great deal of color to the entire presentation. There were 30 members and 17 visitors present at this meeting and during the business session the annual election, which had been held over since June, was completed. Einar Anderson was elected 2nd Vice-President, William Price was re-elected Sergeant-at-Arms, and Maurice Smith was re-elected Educational Chairman. Various committees were also appointed.

● SUNSHINE CITY CHAPTER, *St. Petersburg, Fla., July 10*—Members and guests enjoyed a steak dinner complete with music provided by the Entertainment Committee. The main purpose of the meeting, however, was to hear a talk on codes by Marshall Johnston of the City Building Department. Mr. Johnston gave a very interesting talk on codes and answered questions at the end of his discussion. President Petty announced at the conclusion of the meeting that a committee will be appointed at the next meeting to meet with Mr. Johnston for the purpose of drawing up a refrigeration and air conditioning code for the city of St. Petersburg. Mr. Johnston, as well as the chapter, has written to large cities now operating under a code for a copy of same to use as a guide.

● TWIN CITIES CHAPTER, *Minneapolis, Minn., Aug. 5*—In order to allow more time to the speaker of the evening, John Schank, a scheduled motion picture was cancelled. Chairman Asproth introduced John Schank of the Alco Valve Co., who talked on the construction and operation of thermostatic expansion valves and proper location and methods of attaching feeler bulbs to the suction lines. He also gave a complete description of other control valves manufactured by the company and demonstrated the valves in operation on a glass evaporator.

● WESTERN MASSACHUSETTS CHAPTER, *Springfield, Mass., July 22*—The film that was scheduled for showing on the educational program for the evening did not arrive. However, President James Cargel brought in a hermetic unit starting and reversing mechanism that he had built himself and provided a demonstration on a cut open hermetic unit. A great deal of enthusiasm was expressed over this device and Mr. Cargel was kept busy for some time answering the many questions.

● WOLVERINE CHAPTER, *Lansing, Mich., Aug. 11*—Keith Hamilton was accepted to membership during the meeting and on the educational program there was a discussion on the questions and answers given on the certificate examination taken by eight members of the chapter.

\$ \$ \$

MORE REFRIGERATION BUSINESS

APPROXIMATELY 396,000 farm families and other rural consumers in 44 States and Alaska will get electric service as a result of loans approved by the Rural Electrification Administration during the fiscal year that ended June 30, 1947, the U.S. Department of Agriculture announced recently.

The 1947 funds will enable the borrowers, most of them locally owned and operated rural electric cooperatives, to build over 135,000 miles of new power lines and to increase the capacity of some of the systems already built.

The loans approved amount to \$251,349,-172, a volume of loans exceeded only by the \$300,000,000.00 program of the fiscal year 1946.

The REA reported that despite the fact that more loans have been made in the last two years than in the previous 10 years of the program the backlog of applications as of June 30, 1947 amounted to \$278,000,000.00 as compared with \$196,000,000.00 a year earlier.

Approximately 2,500,000 farms and at least as many non-rural establishments such as cross-roads stores, schools, and residences were still without electric service as of January 1.

DEALERS ORGANIZE IN CHICAGO

REFRIGERATION Service Dealers Association was granted an Illinois Charter July 9 by the Secretary of the State. Edward Riccio, Chicago, is listed as president of the organization.

OHIO SCHOOL SUES 281

(Continued from page 55)

signed the contract and were forced to drop the course when they were inducted into the armed forces. After discharge, the school sued and forced the veterans to pay additional interest as judgment debtors for the time they were in service. Ironically, the veterans could have had a course in air conditioning with tuition paid under the GI Bill of Rights at any of the five approved schools here. The Ohio school is not approved by the Veterans Administration.

"The Ohio school built its cases solely on two clauses of the contract which many students said they had not noticed. Those clauses provide: 1—"This enrollment is not subject to cancellation . . ." and 2—". . . it is agreed that no agreements or promises were made to me other than those printed herein . . ."

"Students contesting the suits unanimously cited countless other promises which had been made to them by salesmen, but the tight language of the contract was against them.

"The suits were brought for the company by a law firm in New York. The senior member of the firm was asked by a Post reporter if the number of suits didn't indicate something was wrong. He answered, 'I can't defend them. I'm not the man to see.' He said he had no knowledge of the company's administrative policy. 'They pay me for the work I actually do,' he said. 'They send a claim in and they tell me to collect it. I have to enforce it.'

"The vice president and credit manager of the company said by telephone from the school that he 'had no idea' so many suits had been brought. He said the company turns over claims to their lawyer and leaves it to him to sue, settle or compromise."

COVER

(Continued from page 29)

Don Haworth, W. C. Timmerman, Stanley Evans, J. L. Converse and Walter Eickmeyer are all members of the chapter and employees of the Thermal Engineering Company who made the prize installation. The application is the Longview Packing Company of Longview, Texas, owned by D. R. Tucker and D. R. Ewing.

While the photo shows only three condensing units, the complete installation includes three S.F. 15 and one L.F. 10 Schnacke units. One of these units is connected to the quick freezer, one to the chill room, one to four coolers, and the fourth unit is a standby. All units are cross connected and valved so that the standby can be used to carry the load of any unit when needed. The well located, spacious machine room houses all the condensing equipment and the electrical panel board which controls the entire plant.

The building is of concrete, steel and terra cotta construction housing a chill room, curing cooler, boning cooler, beef cooler, sales cooler, receiving and loading dock, killing floor, sausage kitchen, smoke house, machine room, spice storage, offices, toilets and a hide and general storage room. In addition to the four compressors, the equipment includes 4 Acme shell and tube condensers, 13 inch coils, one Marley coil, one 5 hp. Allis-Chalmers pump and a 8x12x12 redwood cooling tower.

CONSTRUCTING SUSPENDED CEILINGS

(Continued from page 39)

are toward the inside of the room, leaving a flat surface on top for the application of the insulation. See Figs. 4 and 5. In many instances, however, it is desired to have the flat surface toward the inside of the room. In these cases fillers of insulation are set between the flanges before the application of the rest of the insulation as illustrated in Fig. 6.

Several construction details are common to any of the various types of ceilings described above. For instance, when pencil rods are used as hangers, sleeves of cork covering should be installed on them to prevent frosting which in time could cause damage to the structure. One of the most important points of all is that where the ceiling insulation meets the wall insulation the joints must always be staggered.

"FREON 22" IN "F12" UNITS

(Continued from page 33)

cial oil still and heat interchanger which performed very well in regular operation but did not return the oil fast enough on a temperature pull-down. This fact together with a practice of regulating temperature by adjusting the expansion valve, caused us to burn a set of crank bearings when the cooler became partially oil-logged and the crank-case became low on oil. This occured after about 1000 hours of operation.

Upon taking the machine down we discovered the compression rings were badly worn but the oil rings were well seated and scarcely worn. New compression rings were installed and the oil rings were eliminated entirely, the supposition being that at the high speed the oil rings were too effective. New bearings were put in and an oil separator was installed on the discharge line.

Our experience had been that this machine was very effective to about 0 lbs. suction but at a lower pressure its performance fell off considerably, to such an extent that the pump-down pressure with closed suction valve was 15". We removed the suction valve springs entirely to see if there would be any improvement in the performance.

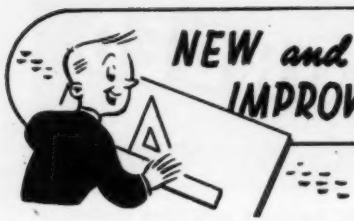
With this work done the machine was assembled and put on its full load.

Performance Improved

Upon starting up the machine sounded fine and a refrigerant liquid flow meter showed an increase in flow over the previous condition. It pumped down to 22" with shut-off suction. At high suction superheat conditions it is noisier than with saturated suction, which is characteristic of a compressor with plate valves. This machine was operated an additional 2000 hours and taken down on general principles for a "look-see" before being put on another job.

The entire machine was found to be in very good condition. Wear at any point did not exceed .0015". All wearing surfaces were nice and bright and there was no indication that this hard service was detrimental in any way.

In summary we can say that this standard F-12 unit, operated with a gas for which it was not designed, at a speed well above its rating, at a suction pressure well below its valve design, operated quite well after the valve springs were removed and the oil return properly taken care of.



NEW and IMPROVED EQUIPMENT

Information contained in this department is furnished by the manufacturer of the article described and is not to be construed as the opinion of the Editor.

Charging Bomb

"CHARGING Bomb" is a descriptive term applied to a small capacity refrigerant cylinder used in manufacturing plants to facilitate more accurate and quicker charging of units carrying small or critical charges.

"Charging Bombs" are made for the exact charge required in the unit. The "bombs" are then filled at a charging stand with the correct amount of refrigerant. Charged "bombs" are then attached to units on assembly line, valve is opened and transfer of charge is done while unit moves along assembly line—eliminating stoppage of assembly line for insertion of refrigerant.

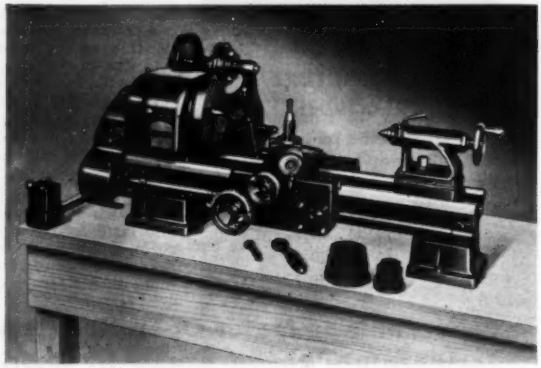
"Charging Bombs" can be made to any required capacity. Their construction is entirely seamless. They come complete with forged brass valve having ⅛" female pipe outlet.

Some major manufacturers have adopted "charging bombs" as an aid to their field servicing. Because charges are "critical" their service organizations are instructed to completely discharge unit being repaired and to replace refrigerant with an exact charge from a factory filled "charging bomb." For this type of service, it is required that "charging bombs" bear an ICC stamping, which permits public carriers to accept them for shipment.

The illustration shows a "charging bomb" 1⅞" O. D. by 11⅞" long, which holds 14 ounces of Freon, and is supplied by the Fine Products Company, 185 North Wabash Avenue, Chicago 1, Illinois, who advise they can supply "charging bombs" for capacities from 10 ounces to and including 5 pounds of Freon.

New Lathe

A NEW 9-inch lathe having the same basic advanced design features that characterize larger lathes of the Logan line is now in production at Logan Engineering Company. With a 9-inch swing, and 18 inches between centers, the lathe is built to make possible new economy as well as lasting accuracy in precision manufacturing operations, general machine shop and tool room work, refrigeration and appliance repair. Its compact size is especially well adapted to home work shops. Like the larger lathes of the Logan line, the new 9-inch Logan Lathe has a ball-bearing spindle mounting inherently well adapted to high-speed operation. The two V-ways and two flat ways of the bed are precision ground to within .0005 inch of parallelism. Massive construction insures steadiness on heavy cuts and durability. Self-lubricating bronze bearings protect vital wear points. Full information on the new lathe, identified by Catalog No. 400, is available on requests addressed to the general offices of Logan Engineering Company, 4901 W. Lawrence Ave., Chicago 30, Ill.



Reseating Frigidaire Low Side Float Needle

RESEATING the low side float needle seat on any Frigidaire is now a one minute job that even an unskilled helper can do accurately according to the manufacturer, by using the new Watsco Float Reseating Tool. This ingenious new device, small in size and foolproof in operation, consists of a mill file clasped in a frame which slides back and forth in a bed. Cast as an integral part of the bed is a sleeve which is drilled and finished so that its inside diameter is exactly the size of the Frigidaire float needle seat.

In use, this sleeve is cupped over the needle seat. It fits snugly, thus holding the file precisely parallel to the face of the seat. A few passes of the file back and forth over the face resurfaces the needle

SEP-RETURN

AUTOMATIC OIL SEPARATOR AND RETURN

LOWEST PRICE ON THE MARKET

*Trade Mark Registered
Patent Pending

Oil-laden hot refrigerant gas from the compressor enters the SEP-RETURN. The gas flows through the Poronze element which causes the oil to separate from the gas and trickle into the sump. The filter-separator is easily cleaned.

The gas now free of oil leaves the SEP-RETURN through this exit port on its way to the condenser.

Steel shell of SEP-RETURN is insulated with sheet asbestos cover to improve efficiency.

Top and bottom halves of shell are joined by silver brazing after assembly.

When enough oil accumulates in sump, float ball raises and opens needle valve permitting oil to return to compressor crankcase.

7½" High. Shell 3" Dia. Base Plate for ¼" Bolts on 3½" Centers.

SEP-RETURN* PAYS FOR ITSELF

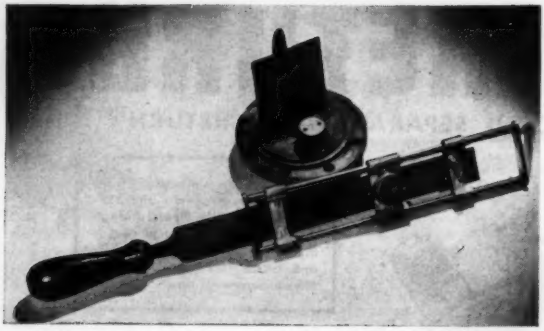
Inlet and Outlet ⅜" SAE. Oil Return ¼" SAE. For Use on Systems Up to one-third H.P.

No. 400 List Price **$8.00**

This amazing SEP-RETURN unit is easily installed and pays for itself in a matter of months by reducing the electric power bill and providing more efficient refrigerating. On new jobs the SEP-RETURN makes it possible to use smaller compressors.

IT SAVES MONEY— IT MAKES FRIENDS

WABASH MANUFACTURING CO.
2642 S. MICHIGAN AVENUE
CHICAGO 16, ILL.



seat accurately. There is no possibility of inaccuracy, no matter how unskilled or careless the mechanic may be; the durable frame automatically lines up the file.

The Watsco Float Reseating Tool may be used on the job if desired, eliminating the need to return the float to the shop for resurfacing on a lathe or drill press. Not even a vise is required; the float can be held in the hands or rested on any surface while the tool is being used.

The entire tool is precision engineered and with the exception of the file, is made entirely of brass. It will maintain its accuracy through a lifetime of use, and because of its low cost, will pay for itself in one or two jobs.

Sold through jobbers, the Watsco Float Resurfacer is priced at $7.50 complete with file and directions for recalibrating the float. If your wholesaler is unable to supply you, write the Wagner Tool & Supply Corp. at 1308 43rd Ave., Long Island City, N. Y., mentioning your wholesaler's name and address. The Wagner organization also are the designers and manufacturers of the Watsco Replacement Terminals, Watsco Oil Ring Puller and other products for refrigeration servicing.

Fire Extinguisher

A NEW 4 pound model dry chemical fire extinguisher, known as the Ansul 4, which the manufacturer states has received very high ratings for effectiveness from national approval agencies, is announced by the Fire Extinguisher Division of Ansul Chemical Co., Marinette, Wisconsin. The extinguisher, only 19⅛ inches long and 3½ inches in diameter and light in weight, is designed for effective use by inexperienced operators, according to the manufacturer.

Like all Ansul dry chemical extinguishers, this latest addition to the Ansul line is suitable for extinguishing fires in inflammable liquids, gases, solids and electrical equipment and also for controlling fires in ordinary combustibles. The extinguishing agent used, Ansul Plus-Fifty Dry Chemical, is claimed to be non-toxic, non-corrosive, non-abrasive and a non-conductor of electricity.

Maintenance is said to be greatly simplified and the extinguisher can be quickly recharged on-the-spot after use. It is supplied with a quick-opening bracket for vertical or horizontal mounting in locations where space is limited. This extinguisher can be used in industrial plants, on trucks, buses, autos, in homes, stores, institutions, boats, etc., for fire hazards that do not demand larger equipment.

Water Cooler

DESIGNED for use where plumbing connections are not available, or where bottled spring water is preferred, is a new bottle-type electric water cooler by the Ebco Manufacturing Company of Columbus, Ohio. Known as the Oasis Model OB-4, the new cooler is especially adaptable for cup service in offices, retail stores, waiting rooms, lobbies, hospitals and homes.

Smart, modern styling of the cabinet permits the cooler to be used in any setting. Finished in Oasis brown opalescent lacquer, the cabinet is of heavy gauge galvanized and bonderized steel, strongly welded in construction. The lower front panel is easily removed for access to the condensing unit. Ebco's exclusive perforated corner grilles in the front panel add that touch of smartness and afford maximum cross-ventilation to the condensing unit. The holes are also provided in the upper right panel for the easy mounting of any standard paper cup dispenser.

The top of the unit is of brown vitreous porcelain enamel on steel with a black molded rubber gasket that is odorless and does not affect the taste of the water.

Capable of serving approximately 80 persons per hour, the new cooler is equipped with a cooling unit of the storage tank type, which holds four quarts of properly cooled water. The tank, which is of stainless steel, is completely cooled by flattened, spiral copper refrigerant coils securely bonded to the outside and insulated by a minimum of 2¼ inches of ground cork on all sides, top and bottom; completely sealed with hydrolene.

The aluminum drip re-

REPAIR TERMINAL LEAKS IN 5 MINUTES!

WATSCO REPLACEMENT TERMINALS

$5.50 PER SET (3 terminals)

Order from your jobber by number

Permanently stop terminal leaks on any sealed unit easily, quickly, profitably. Instead of 6 or 7 hours—5 minutes! Instead of removing the unit—work right on the job! Instead of welding and machining, use only ratchet wrench or pliers! Just screw the WATSCO REPLACEMENT TERMINAL. Put in right over the original terminal post. The job is done!

#1 —for Crosley F-12 Unit

#2 —for Frigidaire—up to and including 1937

#3 —for Kelvinator, Norge, Westinghouse, Chieftain, Tecumseh and Philco.

REMOVE OIL RINGS IN A JIFFY!

WATSCO OIL RING PULLER

Cannot mar or damage ring or shaft. A quality precision tool—made of finest hardened steel, WITH BALL BEARING TIP, cadmium plated. Engineered for lifetime performance!

IF your jobber can't supply you with this and other WATSCO PRODUCTS, order direct from us, Dept. AE, mentioning jobber's name and address.

$7.50 EACH
from your jobber
Part No. P-1

WAGNER TOOL & SUPPLY CORP.

Dept. AE 1308 43rd Avenue, Long Island City, N. Y.

ceptor of neat design is finished to match the cabinet. A stainless steel, louvred, anti-splash tray with convenient lift-out knob adds to its utility. It is new, lightweight, and easy to remove or replace. A quart mason-type glass jar that screws in the rear of the receptor (concealed in the cabinet) increases waste storage capacity to three pints.

For further information on this new unit, address the manufacturer, The Ebco Manufacturing Company, Columbus, Ohio.

Dynamometer

TO MEASURE tension or force in those "tight" spots found in many types of mechanical assemblies, a miniature dynamometer has been developed that is said to be the smallest of its kind. The case measures 3 inches in diameter; the instrument weighs but 1 pound.

It is available in 100 lb., 250 lb. and 500 lb. capacities; has an unbreakable lucite crystal and red, maximum hand. The dial is black with etched silver numerals. Components are die cast of Zamac No. 3 alloy.

The company also makes the larger Model AN dynamometer for measuring forces up to 20,000 pounds, identical to the small model in every detail but size. A complete catalog will be sent on request to the Editor.

Grinder

A NEW offhand or freehand grinder featuring individual arbor mounted wheels and a triple speed selection is announced by the Corlett-Turner Company. It has been especially designed for the multitude of small tool grinding jobs, and every consideration has been given to making possible increased grinding efficiency.

Each grinding wheel is mounted on a ground tapered arbor which fits into a hardened and ground socket in the spindle. The mounted wheel can be changed in a matter of seconds and no tool of any kind is needed to make this change. A slight wrist motion on the end bells of the grinder head releases the wheel arbor and the reverse motion instantly locks it in place. This rapid change feature eliminates the conventional task of changing wheels and consequently there is more assurance that the right wheel will be used. Wheel dressing is also reduced to an absolute minimum since regardless of the frequency of changing, the mounted wheel will run as true as it was when previously in use.

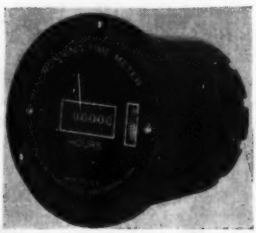
Proper spindle speed is an essential of correct grinding practice. The new Corlett-Turner G3 grinder incorporates a three speed pulley arrangement which permits the selection of the right spindle speed for any vitrified wheel from 1" to 4" in diameter. A simple hand lever permits a quick adjustment of the belt to the required position. Another important feature in this respect is the ease of changing belts. This can be accomplished very quickly as it is unnecessary to remove the spindle or the bearings.

Apart from its primary use as a grinder the G3 is especially adaptable for deburring operations, polishing, buffing and many other applications requiring the use of a high speed spindle. In addition to a selection of vitrified wheels mounted individually on tapered arbors, a collet type arbor is also included as standard equipment. The collet has a capacity of ¼" and widely increases the range of usefulness of this machine. All types of mounted wheels and tools such as rotary files, drills, countersinks, etc., can be used on this high speed precision spindle.

The lighting fixture is equipped with safety glass and has been custom built to provide the maximum amount of light in the working area. The steel tubing arm keeps the light rigidly in place, but ball type knuckles at the base and head of the tube allow it to be easily moved to any position desired. The tool rest is also instantly adjustable. The machine is precision built throughout. The spindle, which is hardened and ground, is powered by a ⅓ h.p. motor and the entire unit, which has been ruggedly constructed, has a smart and neat appearance.

Time Meter

MANUFACTURED by The R. W. Cramer Company, Inc., Centerbrook, Connecticut, the new Time Totalizer or Running Time Meter features a counter that can be reset to zero. Designed for use on AC circuits, meters automatically register total operating or idle time of any circuit, machine or system to which connected.



Precision-built five digit revolution type counter made of especially developed metals has demonstrated resistance to wear. Indicates in

tenths up to 10,000 hours, then repeats.

Running Time Meters with reset feature are available in three models. Type E5, furnished in attractive die casting, suitable for table use. Type E6, enclosed in metal housing arranged for conduit connection, complete with hinged cover and hasp for padlocking. Type E7, illustrated, is a 3¾" diameter instrument enclosed in combination die cast and bakelite housing for flush panel mounting, is equipped with knob reset accessable from front.

Cramer Time Totalizer or Running Time Meters can be furnished for 60 or 50 cycle frequency, 110 or 220 volts.

For complete data, write the Editor.

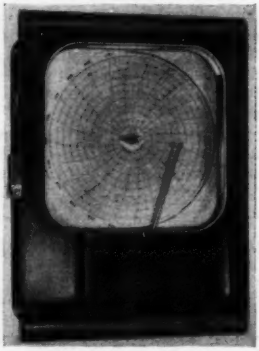
Appliance Tester

A NEW 4-in-1 Appliance Tester which checks voltage, amperage and two separate temperatures all at one time is now offered by the Kelvinator Division of the Nash-Kelvinator Corporation.

The two temperature readings, which are registered electrically, can be taken in the same or in two separate refrigerators, home freezers, display cases, reach-in cabinets, etc. The entire instrument, weighing less than 10 pounds and compactly built into a special carrying case, makes it possible for servicemen to make accurate temperature adjustments and obtain precise electrical circuit analysis. Developed in collaboration with Kelvinator service engineers, the new tester is manufactured by J. B. T. Instruments, Inc., New Haven, Connecticut.

Gauge

A NEW line of recording thermometers and recording gauges known as the Series 500 line of recorders has just been announced by The Bristol Company, Waterbury 91, Conn. These instruments operate on the same basic principles as those used in recording thermometers



and gauges built by the company for many years. They are, however, housed in a newly-developed modern case and incorporate many design improvements to make them easier to use, more convenient to service, and readily convertible from one type to another. In addition, the company has, wherever possible, simplified the construction of the instrument.

The case is designed so it can be mounted either on a wall, front of panel, or flush on a panel and can be easily converted by the user at any time from one type of mounting to another. Other case features include a heavy inlaid sponge-rubber door gasket, flush roll-type door handle, and non-projecting door hinges.

Pen arms are pivoted on stainless steel journals with the pen arm shaft supported at both ends in a rigid one-piece mounting. The journals are ground and polished to provide low-friction action. Link members between the measuring element and pen-arm mechanism are readily removable without tools and can be equipped with over-range and under-range two-way springs when required. Improvements have been made in the measuring element to improve its accuracy and the ease with which it can be adjusted.

Series 500 Recording Thermometers and Gauges are furnished in 8-inch and 12-inch sizes in a wide variety of ranges.

Fittings

NO LONGER is it necessary for the jobber or dealer to stock a full and complicated line of standard compression, SAE flared, inverted flare and other connector fittings.

Everseal "Self-Flaring" Fittings—the fitting that automatically flares the tubing as the connection is made—are now available in a display

assortment consisting of 687 of the most widely used sizes. This stock of 12 different types of fittings replaces an entire line of ordinary fittings. Mechanics no longer need flaring tools.

The No. E320 Everseal assortment is housed in a 2-drawer all-metal display cabinet with 64 spacious compartments (see illustration). The inside top cover of each unit contains an easily-read listing of fitting part numbers, quantities and list prices. The colorful, compact display cabinet allows all fittings to be shown at a glance. A handy plastic divider keeps fittings dust-free and salable at all times.

Repairmen everywhere are loud in their praise of this new fitting that eliminates the flaring operation. The Everseal "Self-Flaring" Fitting automatically flares Bundyflex, copper, aluminum, monel and annealed steel.

News of the Equipment Industry

ASRE ISSUES PAPER ON AIR CONDITIONING IN CANDY MANUFACTURE

THE general principles and techniques of air conditioning as applied to candy manufacture are described in a pamphlet "Air Conditioning in Candy Manufacture"—designated as Application Data 39, issued recently by the American Society of Refrigerating Engineers, 40 West 40th Street, New York City.

The candy industry has found the control of temperature and humidity to be an essential part of most of its manufacturing operations and through the use of air conditioning and refrigeration, changing atmospheric conditions and their adverse effect on production have been completely eliminated. The pamphlet tells how properly to apply air conditioning and refrigeration to control candy manufacture.

The pamphlet contains information on cooling tunnels, cold rooms, hot rooms, revolving coating kettles, methods of supplying refrigeration and miscellaneous operations of candy manufacture. Priced at 20c, it may be obtained from ASRE.

S S S

IMPERIAL DIASEAL VALVE ADVERTISING AWARDED SILVER PLAQUE

THE Imperial DiaSeal Valve advertisements which appeared in Refrigeration Service Engineer during recent months form the advertising campaign which has been awarded a NIAA silver plaque on which is engraved, "for the campaign which in the opinion of the judges is of outstanding excellence in its planning and execution."

This campaign, consisting of four full-page color advertisements, was entered in the 1947 NIAA Panels Exhibit in competition with hundreds of other advertising campaigns in the industrial products section. Selections were made by a committee of outstanding industrial advertising men and the awarding of the plaques to the top winners was a highlight of the National Industrial Advertisers Association Silver Anniversary Conference recently held in Milwaukee. The NIAA is an association of leading industrial advertisers throughout United States and Canada.

Kreicker & Meloan, Inc., is advertising agency for Imperial and Ed. Todd is Imperial's advertising manager.

S S S

FRIGIDAIRE PRICE INCREASES

A LIMITED increase in the prices of some products was announced August 21, by Frigidaire Division, General Motors Corporation.

Frigidaire appliances affected by the price adjustment include electric refrigerators, showing an increase of $5 to $15, with no increase on three models; electric ranges from $5 to $10, with no increase on two models; and the automatic electric washer, which has been increased by $15.

There is no increase in the prices of Frigidaire home freezers, electric dryers and ironers.

Commercial refrigeration and air conditioning product prices, the announcement stated, have been adjusted upward, on an average, by approximately 2⅓ per cent. There is no increase on approximately one-half of the more than 200 products in this group.

"It had been our earnest hope that Frigidaire continue its current price schedules despite mounting costs of production," Mr. Bratten said. "This hope, however, could not be realized because many of the items we buy cost more than they did just a short time ago. Also, material shortages are preventing our reaching anticipated production levels."

S S S

MIDWEST WHOLESALERS TO MEET

THE fall meeting of the Midwest Refrigeration Equipment Wholesalers Association will be held September 29, 30, at the Fort Des Moines Hotel, Des Moines, Iowa. Those planning to attend should write the hotel direct for reservations at once giving arrival time.

There will be a closed meeting Monday morning, a joint luncheon with manufacturers' representatives Monday noon, and an open meeting Monday afternoon with manufacturers and wholesalers.

Tuesday morning will be a closed meeting for wholesalers and joint luncheon at noon.

The afternoon session will again be a joint meeting followed by a cocktail party and banquet.

THERMAL COMPANY, INC., OPENS NEW MODERN QUARTERS

THERMAL Company, Inc., Refrigeration Wholesalers of St. Paul, Minnesota, held a two-day opening recently of their new modern quarters located at 2526 University Avenue. Some 300 people registered during the opening and there were many casual visitors in addition. Scores of friends and well wishers sent flowers, providing a beautiful floral display.

The building has a 100-foot front on University Avenue, the main thoroughfare between the Minneapolis and St. Paul loop districts. The building front is of cream colored Mankato stone with a St. Cloud granite base. The entire 100-foot front is occupied by a fluorescent lighted showroom. The general offices are located on the ground floor with mezzanines on both ends, housing the engineering, advertising and some executive offices. The interesting feature of the building is the basement lecture room which will seat approximately 200 people. This room has its own facilities and meetings can be held there without disturbing the normal functioning of the company's business. This is accomplished by an outside entrance and a special commissary to provide for the needs of the lecture hall. This room has already been used to good advantage for meetings sponsored by various association groups for educational purposes. This room, of course, was used during the official opening.

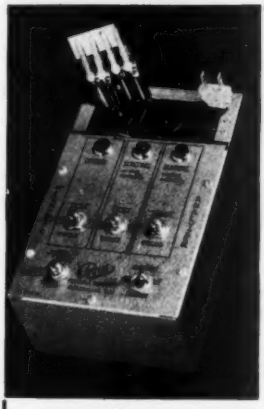
The entire front portion of the building is completely air conditioned, automatically controlled and can be proportioned throughout the area wherever the need may occur. Interior walls of the showroom are a cream colored decorative brick; the floors are laid in an alternate pattern of red and brown asphalt tile. The building is entirely sprinklered and practically fireproof with its all steel, brick and concrete construction.

Photos taken during the opening of Thermal Company, Inc., new quarters in St. Paul, Minn. 1—A view of the new building. 2—Mrs. Robert Thees, secretary to H. W. Small, takes registration of guests. 3—A group in the lobby discuss the opening. 4—H. H. Hauer, Application Engineer, discusses problems with Mr. Matuska of Matuska Refrigeration Service, Lakefield, Minn.

FOR DEPENDABLE SERVICE
QUICFREZ

The PIONEER of Farm Locker Plants—Now Ready for Immediate Delivery. Place Orders NOW.

SANITARY REFRIGERATOR CO.
FOND DU LAC, WISCONSIN
Farm Locker Plant Since 1939, Ice Refrigerators for More Than 40 Years



Let "Annie" Do It!

HERE IT IS!

A hermetic unit analyzer which in a matter of seconds will positively indicate the nature of any defect in the electrical system.

ACTS AS A SALESMAN—

Also, you can now positively show the owners of such equipment just what is wrong and thus gain their confidence.

NO TIME LOST—NO LABOR LOST—NO GUESSWORK

It is a repair man's answer to the nightmare of not knowing what is wrong without the labor of transporting to the shop and then submitting to a series of tests; an exact estimate on the spot.

ACCURATE—YOU CAN NOW ESTIMATE CLOSELY WITHOUT FEAR OF HAVING TO TAKE A LOSS

This is a "must" in any repair box. Be sure yours has it. Don't be embarrassed by having a prospective customer asking you, "How do you know?"

SPECIFICATIONS—"ANNIE" weighs only 1¾ lbs.—size, 3" x 5" x 8"—will fit into tool box. Price $16.50.

ORDER FROM YOUR JOBBER OR DIRECT. INCLUDE JOBBER'S NAME AND ADDRESS. MAKE CHECK OR MONEY ORDER PAYABLE TO:

Mechanical Enterprises

Dept. 36

7736 Tujunga Ave. North Hollywood, Calif.

PHILCO TO EXPAND BY ACQUIRING REX MANUFACTURING COMPANY

IN A further expansion of its refrigerator and freezer division, Philco Corporation is acquiring the production facilities and all other assets of the Rex Manufacturing Company, Inc. of Connersville, Indiana, it was announced recently by John Ballantyne, president of Philco Corporation. For the past several years, Philco has purchased the entire refrigerator output of the Rex plants and has had an investment of $973,000 in the preferred stock of that Company.

In acquiring the Rex Company, Philco will issue a net total of 51,993 shares of its $3 par value common stock which has been authorized but not issued. Net income of Rex for the past 12 months is substantially in excess of earnings on the additional Philco shares to be issues.

Operations of the Rex Manufacturing Company will continue without any change under the direction of the present executive management, and no changes in policies or personnel are contemplated.

Since entering the household refrigerator field in 1938 and home freezers in 1945, Philco has made rapid progress in winning public acceptance for these products and increasing its production facilities, so that today it is one of the leading factors in the industry.

In 1946, sales of refrigerators and freezers amounted to nearly 25% of total Philco volume. The plant facilities now being acquired combined with the large new Philco refrigerator-freezer plant in Philadelphia gave Philco a refrigerator production capacity several times as great as in 1941.

Philco has a backlog of refrigerator and freezer orders totaling approximately $98,000,000, and capacity operations to meet this demand will be required for a considerable period ahead.

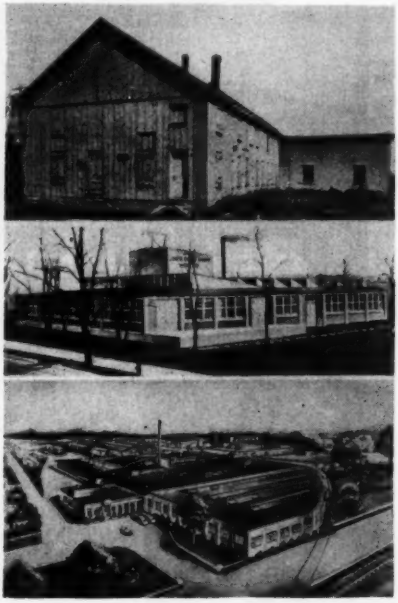
* * *

JAMISON ANNOUNCES NEW PLANT, NEW LOWERED PRICES

THE Jamison Cold Storage Door Company, of Hagerstown, Md., biggest firm of its kind in the world, has moved into enlarged quarters once again. Completion of extensive factory additions, which increase manufacturing capacity by more than 50 per cent, has been announced by J. V. Jamison, Jr., Chairman of the Board. This is the fifth expansion in the company's 42-year history.

At the same time, effective as of August 4, the company has substantially lowered prices on all Jamison, Stevenson, Victor and NoEqual Doors, the well-known lines which they manufacture. The announcement of lowered prices is significant of what one manufacturer has accomplished in the face of rising costs, through extensive improvements and efficient mass production.

The new plant, Mr. Jamison said, is believed to be the most modern and most completely equipped plant in the world exclusively devoted to the manufacture of cold storage doors. The most modern machinery available has been installed, and streamlined production methods have been introduced that will promote the greatest efficiency of operation. This, plus the fact that after nearly half a century of specializing in this field, the company is now turning out more cold storage doors than ever before, is responsible for their being able to announce the new lowered prices.



In the three views of successive plants occupied by Jamison Cold Storage Door Co. since 1905, the top photo shows the first plant used from 1905 to 1909. Center is the third plant used from 1913 to 1921. Bottom is the new plant occupied recently. Two other plants not shown were used in the intervening years.

REMCO MOVES

MANUFACTURING operations and offices of Remco, Inc., formerly of Pittsburgh, Pa., have been moved to Zelienople, Pa. Remco products will be manufactured in the new Halstead & Mitchell plant at Zelienople.

KNIGHT JOINS BETZ CORP.

APPOINTMENT of V. C. Knight as Vice President and General Manager has recently been announced by Lyman B. Betz, president of the Betz Corporation, Hammond, Ind.

V. C. KNIGHT

Mr. Knight has purchased stock in the Betz Corporation, manufacturers of Filterpure Forced Convection Coils, and will oversee important functions of office and plant management.

Prior to his association with Betz Corporation, Mr. Knight was Vice President in charge of production for McCray Refrigerator Co.

PERFECOLD ENLARGES

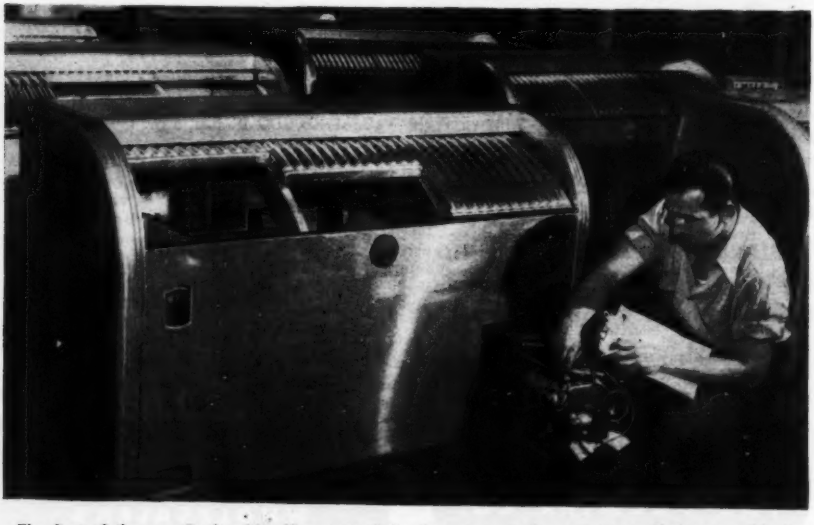
IN LINE with its present expansion program in the commercial refrigeration field, Perfecold of Los Angeles is enlarging and remodeling its headquarters building at 1940 South Main Street in Los Angeles, Calif.

Under Perfecold's new plans, more than 10,000 square feet of office and warehouse space will be available to company personnel. Offices are being refurnished and air conditioned, while the warehouse area is being expanded to allow for a modern refrigeration assembly line.

New offices are under construction for the service and parts section, the modification division and the sales department. A large show room for refrigeration equipment will also be built during the latter part of the summer. Remodeling will be completed by the first of next year.

Perfecold has constructed a new self-contained dry beverage cooler. Available in two models, 5 and 8-foot sizes, the new cooler has a special all-aluminum case, designed to give heavy wear under all conditions.

Feature of the cooler is the self-contained 1/3 hp. Mills light-weight condensing unit, which is factory installed to facilitate immediate use in any area; only plug-in is necessary. The Mills unit can be easily removed from the cooler for cleaning and



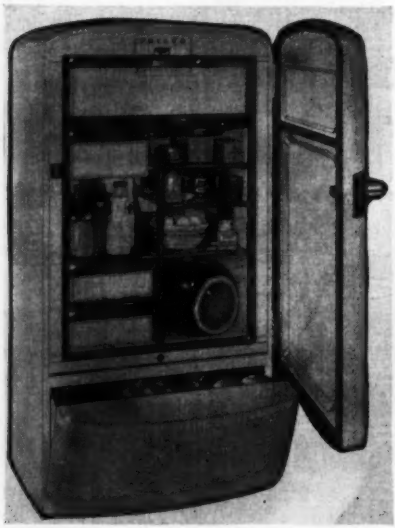
The first of the new Perfecold self-contained dry beverage coolers to come off the assembly line are shown being inspected prior to shipment by Wayne McCormack, Perfecold Service engineer.

maintenance purposes by unscrewing a few bolts and sliding it out on attached rails.

Other important features of the cooler are the two convenient utility shelves; finest quality satin finish, built for wear in all climates; sturdy light-weight case, making shipment easy; disappearing doors, which open on finger-touch action; and the attractive chrome-luster aluminum, which blends with all fixtures and surroundings.

NEW MODEL PHILCO

THE new Philco Model 773 advanced design refrigerator is considered the most useful model designed by the company because of new features offered. A new "Summer-Winter" control for the moist cold food



The new 7 cu. ft. model Philco.

compartment keeps perishable foods fresh, with their natural color, flavor and juice, in any climate. Another new development is an oversize freezer locker, holding 32 pounds of frozen foods, with specially insulated door to prevent cold loss or outside condensation; plus a separate shelf, above this frozen food compartment, for storing four "easy-out" ice trays containing 56 cubes. A third unique feature of this Philco refrigerator is its new "fingertip" adjustable shelves which permit more than 14 different shelf arrangements. Bulky foods and bottles are easy to reach anywhere in the 16.9 sq. ft. of refrigerated shelf area. This shelf capacity is approximately 10 percent greater than that of previous 7 cu. ft. refrigerators. Other features of the Philco Model 773 refrigerator include a separate vegetable bin holding 55 pounds of non-refrigerated foods; two glass-covered sliding crisper drawers for fresh vegetables and fruits; a sliding meat storage drawer; porcelain interior and enameled exterior; and the famous Philco Super Power System, the hermetically sealed power unit covered by a 5-year guarantee.

LIQUID CARBONIC PERSONNEL

A RE-ORGANIZATION of the service and sales engineering departments in The Liquid Carbonic Corporation to keep pace with increasing customer needs is announced by Executive Vice-President J. H. Pratt.

Cecil Merryman has been appointed Soda Fountain Service Manager for all sales regions of the company, and Stanley H. Palmer has been made Ice Cream Cabinet Service Manager.

C. MERRYMAN S. H. PALMER

Mr. Merryman who was transferred from Cleveland, Ohio, where he was Central Region fountain-cabinet service manager, joined the company in 1928 in Cincinnati, in 1935 was made service manager there and in 1945 was transferred to Cleveland.

Mr. Palmer joined the Liquid organization in 1945 after two years with the navy as a civilian radar field engineer. Before that he was ice cream cabinet service supervisor of the Telling Bell Vernon (ice cream) Company in Ohio for several years.

John G. Praetz, who had been general service manager of the Fountain-Cabinet Division for seven years, was made Director of Service and Sales Engineering for the company's Bottling Machinery division.

I. H. COHLER JOINS KRAMER TRENTON SALES STAFF

THE Kramer Trenton Co. of Trenton, N. J., announces that I. H. Cohler has been appointed their sales representative in the Chicago area.

I. H. COHLER

Mr. Cohler attended Armour Institute of Technology now known as the Illinois Institute of Technology. His many years of experience include design and product engineering of various refrigeration products, and four and one-half years spent in engineering and sales capacities for Kelvinator Division of Nash-Kelvinator. Several years as manufacturers' sales representative in the Chicago territory were interrupted by the war, during which he did war plant engineering. Since that time, he has again acted as manufacturers' sales representative.

WILSON REFRIGERATION, INC. ENTERS URBAN MARKET

ENTRY of Wilson Refrigeration, Inc., a Division of Wilson Cabinet Co., Inc., into the New York and Chicago market is announced by John E. Wilson Jr., President of Wilson Refrigeration, Inc., of Smyrna, Delaware, with the appointment of Paul A. Hunker of New York as manager, Special Accounts Division, for the company in the metropolitan areas of both cities. Mr. Hunker will spearhead plans to extend distribution of Wilson home and farm freezers and other commercial refrigeration products through department stores, syndicate purchasing agencies, national and private brand accounts.

Mr. Hunker said that after launching the urban distribution program in the metropolitan New York and Chicago areas, he will later extend his activities to other cities in keeping with the domestic and export sales expansion plans of the Wilson Co.

Mr. Hunker also will act as technical consultant to the Gardiner Trading Corporation, export distributiors for Wilson products. He has established offices at 29 Pearl Street, New York City.

He is well known in the refrigeration field. He formerly was affiliated with the General Electric Co., General Electric Distributors, and Rex Cole, Inc.

S S S

STERLING SMITH ESTABLISHES OWN BUSINESS

STERLING SMITH resigned his position as Sales Manager of the Baker Ice Machine Co., Omaha, Nebr., effective July 1, to found his own business. Mr. Smith's new organization will act as the national sales agency of the Refrigeration Division of the Sterling Mfg. Co., Omaha, Nebr., manufacturers of truck refrigeration units. During the war, Mr. Smith was Chief of the refrigeration division of the War Production Board.

S S S

ARMSTRONG OPENS IN OMAHA

THE Building Materials Division of the Armstrong Cork Company recently reopened its office in Omaha, Nebraska, where operations had been suspended during the war period because of the manpower shortage. The new office is located in Room 309, Patterson Building, 805 South 17th Street, and the telephone is Atlantic 1522.

T. D. Lent, salesman from the Kansas City office, has been moved to Omaha to act as representative from that point. He will handle industrial insulations for low-temperature installations. Later this year a salesman for other Armstrong building material products will be added. The office will function as a branch of the Division's district office in Kansas City.

S S S

NEW CATALOGS AND BULLETINS

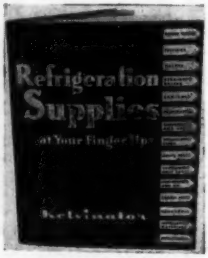
MINNEAPOLIS-HONEYWELL REGULATOR COMPANY, Minneapolis, Minn., have issued a booklet which explains that if you take a hairpin, a window screen and a tin can and put them all together, you have solved the secret of electronics. It is as simple as all that, as you may read for yourself if you write for one of the booklets.

PENN ELECTRIC SWITCH CO. has issued a new 12-page, 2-color catalog featuring the company's load-carrying, 2-pole Series 270 line of refrigeration and air conditioning controls. Complete information is given including a listing of standard types available, specifications, dimensions and typical wiring diagrams illustrating the application versatility of the 2-pole construction.

Illustrations together with specifications are shown for each of the various types of pressure and temperature models. An interesting feature of the catalog is the new system of simplified Code Numbers for each type which facilitates ordering.

Copies of this catalog, which is designated as Bulletin 2652, are available free of charge upon request. Write direct to Penn Electric Switch Co., Goshen, Indiana.

KELVINATOR DIVISION of the Nash-Kelvinator Corp., has published a new 88-page refrigeration supplies catalog for use by service contractors, dealer service organizations, and ice cream and bottle beverage manufacturers.



The new catalog, attractively printed in two colors and featuring the use of large, clear, product illustrations, is the first catalog issued by the company in the postwar period and incorporates the many new lines of refrigeration supplies added by Kelvinator in recent months. In addition to nationally recognized lines of refrigeration supplies, the complete line of Kelvinator-made parts including compressors, stainless steel evaporators, driers and component parts for condensing units are shown.

Among the features of the catalog which make it convenient for the customer to use is a quick reference index guide, sectional grouping of products according to type and uniform grouping of part numbers, specifications and prices. Complete "How to Order" information as well as several reference tables and charts of value to refrigeration servicemen are also included.

CHASE REFRIGERATION SUPPLY COMPANY, Chicago wholesaler of refrigeration and air conditioning supplies announces its new Fall and Winter Catalog. A well-compiled, 120-page book, it strikes a new note in refrigeration catalog design.

Particularly effective is the modernistic laminated cover. It shows a clear photographic view of Chicago's tall buildings and picturesque lake front, with gothic lettering in bold orange and black contrast. Every

detail of its appearance reflects the progressiveness of the Chase firm, Chicago's oldest refrigeration and air conditioning supply house.

Occupying the fore of the book is a complete alphabetical index. Following in sequence are full-page listings of condensing units, compressor parts, coils, temperature controls, valves, dehydrators, etc.

The catalog is printed on high-grade enamel stock. Copies are available to established contractors and service engineers.

AMERICAN AIR FILTER CO., INC., explain the application of replaceable type air filters for ventilating and air-conditioning systems in an eight-page booklet issued recently. Descriptions and illustrations of each type filter are given, along with instructions for maintenance and detailed engineering and installation data.

Issued free upon request—write American Air Filter Co., Inc., 215 Central Ave., Louisville 8, Ky.

THE INTERNATIONAL NICKEL COMPANY has published a new sixteen-page booklet on the materials required for the metal-arc, oxy-acetylene and submerged melt welding of nickel and the high nickel alloys. Also, it lists such general information as the type of welding rods to use, recommended amperages for electric-arc welding, and the proper flux to select for gas welding and brazing. Information also is included on technical booklets on the subject of welding of the high nickel alloys and sources of supply for electrodes and gas welding wire. It is being distributed without charge. Write the company at 67 Wall Street, New York 5, N. Y.

THE B. F. GOODRICH COMPANY, Akron, Ohio has published a new catalog leaflet on its light duty V-belts. The leaflet describes construction of the product, lists publications which assist the user in selecting the right belts and carries a page of tables giving all pertinent data on standard stock sizes.

McQUAY, INC., 1600 Broadway N.E., Minneapolis 13, Minn., has issued new bulletins describing McQuay Junior Unit Coolers, Dual Purpose Unit Coolers, Standard Unit Coolers, High Humidity Unit Coolers, Quick Release Ice Cube Makers, Multilouvre Coils, Storage Room Coolers, and Zer-O-Pak Low Temperature Units. Copies are available upon request.

Index to Advertisers

Classified Ads

Rate: $2.50 for fifty words or less, 40 cents for each additional ten words or less.

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To call on wholesale distributors for manufacturer of household refrigerators and radios. Midwest and Southern territories open. Must be willing to travel extensively. Requires good technical knowledge and pleasing personality. Previous distributor or factory experience desirable. Write fully giving experience, education, salary requirements, marital status. Address Box SP-3, The Refrigeration Service Engineer, 433 N. Waller Ave., Chicago 44, Ill.

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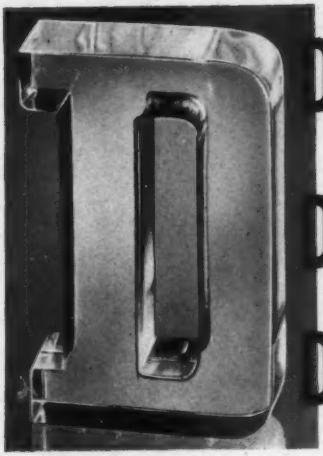

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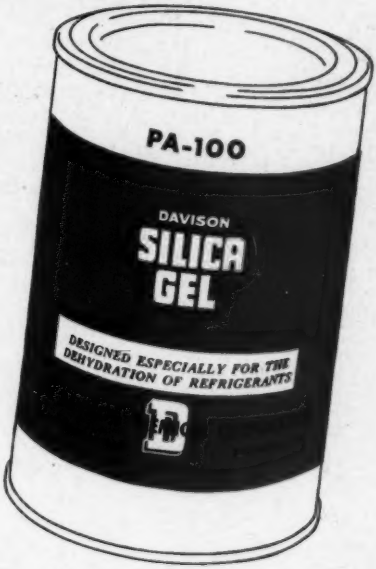

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